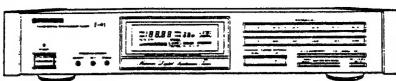


# Service Manual



ORDER NO.  
ARP 1465

FM/AM DIGITAL SYNTHESIZER TUNER

**F-91**

**Original**

MODEL F-91 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Power requirement	Export destination
KU/CA	AC120V only	U.S.A and Canada
HE	AC220V, 240V (switchable) *	European continent
HB	AC220V, 240V (switchable) *	United Kingdom
SD/G	AC110V, 120V-127V, 220V, 240V (switchable)	U.S.Military
HEZ	AC220V, 240V (switchable) *	West Germany

\* Change the primary wiring of the power transformer.

- This service manual is applicable to the KU/CA, HE, HB, SD/G and HEZ types.
- As to the HE, HB, SD/G and HEZ types, please refer to pages P39-P40.
- Ce manuel pour le service comprend les explications en français de réglage. (P28-P29)
- Este manual de servicio trata del método ajuste escrito en español. (P30-P31)

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# 1. SPECIFICATIONS

## FM Tuner Section

Frequency range	87.5 MHz to 108 MHz
Usable Sensitivity	Mono; 9.8 dBf, IHF (0.85 $\mu$ V/75 $\Omega$ )
50 dB Quieting Sensitivity	
U.S. and Canadian models	Mono; 12.8 dBf, IHF (1.2 $\mu$ V/75 $\Omega$ ) Stereo; 34.8 dBf, IHF (15 $\mu$ V/75 $\Omega$ )
U.K. and other destination's models	Mono; 15.3 dBf, IHF (1.6 $\mu$ V/75 $\Omega$ ) Stereo; 35.9 dBf, IHF (17 $\mu$ V/75 $\Omega$ )
Sensitivity (DIN)	Mono; 0.75 $\mu$ V/75 $\Omega$ Stereo; 20 $\mu$ V/75 $\Omega$
Signal-to-Noise Ratio	
U.S. and Canadian models	Mono; 95 dB (at 80 dBf) Stereo; 88 dB (at 80 dBf)
U.K. and other destination's models	Mono; 95 dB (at 80 dBf) Stereo; 87 dB (at 80 dBf)
Signal-to-Noise Ratio (DIN)	Mono; 77 dB Stereo; 73 dB
Distortion (at 80 dBf)	Mono; 0.015% (100 Hz) 0.009% (1 kHz) 0.02% (10 kHz) Stereo; 0.02% (100 Hz) 0.02% (1 kHz) 0.07% (10 kHz)
Capture Ratio	0.8 dB
Alternate Channel Selectivity	85 dB (400 kHz)
Stereo Separation	65 dB (1 kHz) 55 dB (20 Hz to 10 kHz)
Frequency Response	+0.2 dB (20 Hz to 15 kHz) -0.8
Image Response Ratio	70 dB
IF Response Ratio	100 dB
AM Suppression Ratio	70 dB
Spurious Response Ratio	80 dB
Subcarrier Product Ratio	60 dB
Muting Threshold	25.2 dBf (5 $\mu$ V/75 $\Omega$ )
Antenna Input	75 unbalanced

## AM Tuner Section

Frequency range	531 kHz to 1602 kHz (Step 9 kHz) 530 kHz to 1700 kHz (Step 10 kHz)
Sensitivity (IHF, Loop antenna)	150 $\mu$ V/m
Selectivity	40 dB
Signal-to-Noise Ratio	50 dB
Image Response Ratio	40 dB
IF Response Ratio	60 dB
Antenna	Loop Antenna

## Audio Section

Output (Level/Impedance)	
FM (100% MOD) FIXED	650 mV/0.9 k $\Omega$
AM (30% MOD) FIXED	150 mV/0.9 k $\Omega$

## Miscellaneous

Power Requirements	
U.S. and Canadian models	AC120V, 60 Hz
U.K. model	a.c.240V-, 50/60 Hz
Other destination's models	AC110V/120-127V/220V/240V (switchable), 50/60 Hz
Power Consumption	25W
Dimensions	457 (W) $\times$ 85 (H) $\times$ 316 (D) mm 18 (W) $\times$ 3-3/8 (H) $\times$ 12 - 7/16 (D) in
Weight (without package)	5.2 kg (11 lb 8 oz)

## Furnished Parts

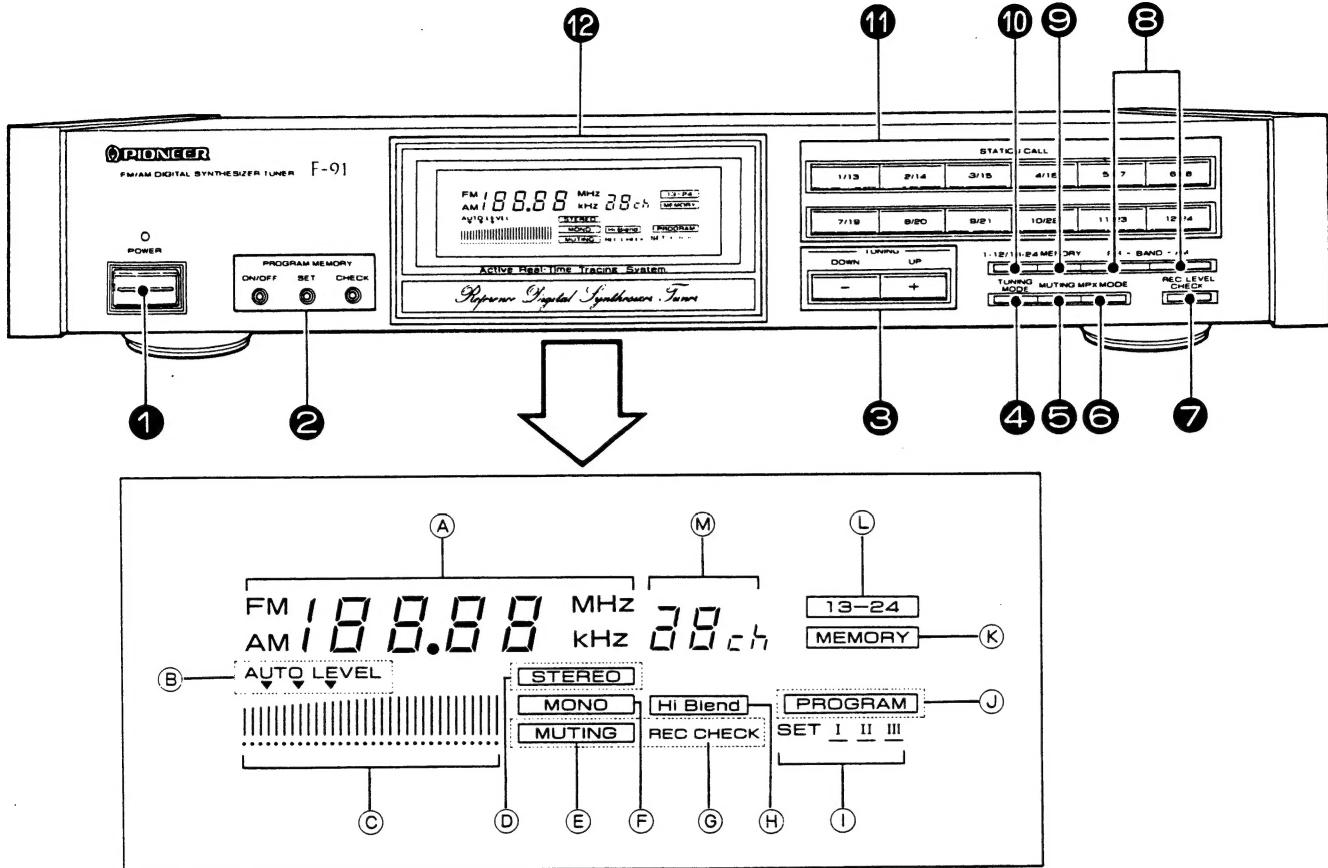
FM T-type Antenna	1
AM Loop Antenna	1
Connecting Cord with Pin Plugs	1
Antenna adaptor *	1
Control cord *	1
Operating Instructions	1

\* Not attached on U.K. model.

### NOTE:

Specifications and design subject to possible modification without notice due to improvements.

## 2. PANEL FACILITIES



### 1 POWER switch/Indicator

- Press to turn power on . . . . . on
- Press again to turn power off . . . . . off

### 2 PROGRAM MEMORY buttons

Convenient for programmed recording.

#### ON/OFF:

Set to ON, and the three memorized stations will be recalled in sequence as power is turned off and on again.

#### SET:

Press to set the program memory contents.

#### CHECK:

Press to confirm the program memory contents.

### 3 TUNING UP/DOWN switches

Use these switches to tune in broadcasting stations. Press UP (+) to receive a station whose frequency is higher than the displayed frequency, and DOWN (-) to tune in to a lower frequency station.

### 4 TUNING MODE switch

To select the tuning mode. It changes each time the switch is pressed:

#### → MANUAL:

Frequency changes by one step each time one of the TUNING UP/DOWN switches is pressed. When the switch is held depressed the frequency will change continuously.

— AUTO LEVEL indicator off

#### AUTO 1:

Press one of the TUNING UP/DOWN switches once. The unit will automatically scan the frequency band and stop when it finds a station (a too weak signal station will be ignored). In this case use MANUAL tuning mode.

— [▼] AUTO LEVEL indicator lights up

#### AUTO 2:

Tuning will stop at stations with more than medium signal strength.

— [▼] AUTO LEVEL indicator lights up

#### AUTO 3:

Tuning will only stop at strong signal stations.

— [▼] AUTO LEVEL indicator lights up

**5 MUTING switch**

The muting circuit is designed to remove the typical FM interstation noise generated when moving away from in-tune frequencies, but it can also prevent reception of distant or weak signal stations. In this case, press the MUTING switch off and tune into the desired station. Normally, leave this switch on (MUTING indicators lit).

This switch does not affect AM reception.

**NOTE:**

The setting of this switch is memorized together with the station in the station memory.

**6 MPX (multiplex) MODE switch**

Mode changes as follows each time this switch is pressed:

**STEREO:**

For listening to FM stereo broadcasts (the indicator lights up, when a stereo broadcast is received. The indicator also lights, when a stereo broadcast is received in Hi-Blend Mode.).

— [STEREO] indicator lights up

**STEREO**

**MONO:**

To receive stereo broadcasts in monaural.

— [MONO] indicator lights up

**MONO**

**Hi-Blend:**

Select this position when the stereo signal is noisy. High frequencies will be blended, improving sound quality.

— [Hi-Blend] indicator lights up

**Hi Blend**

**NOTE:**

The setting of this switch is memorized together with the station in the station memory.

**7 REC LEVEL CHECK switch**

To set the tape deck recording level when recording FM broadcasts. Press this switch on (the REC CHECK indicator will start flashing), and an FM recording standard level signal (frequency: approx. 330 Hz; level: equivalent to 50% modulation FM) will be continuously delivered from the OUTPUT jacks. Adjust the tape deck level meter reading to approx. -2 dB to obtain an appropriate recording level. Always press this switch off after setting the recording level (the REC CHECK indicator will go off).

**8 BAND selector switches****FM:**

Press to receive FM broadcasts.

**AM:**

Press to receive AM broadcasts.

**9 MEMORY switch**

Press to memorize preset stations.

The [MEMORY] indicator will remain lit for about 5 seconds. Press the desired STATION CALL switch to memorize it during this period.

**MEMORY**

**10 [1-12/13-24] Station call selector switch**

Use this selector to choose between channels 1-12 and 13-24 when memorizing station frequencies or recalling already stored stations. The [13-24] indicator lights up when channels 13-24 are selected.

**13-24**

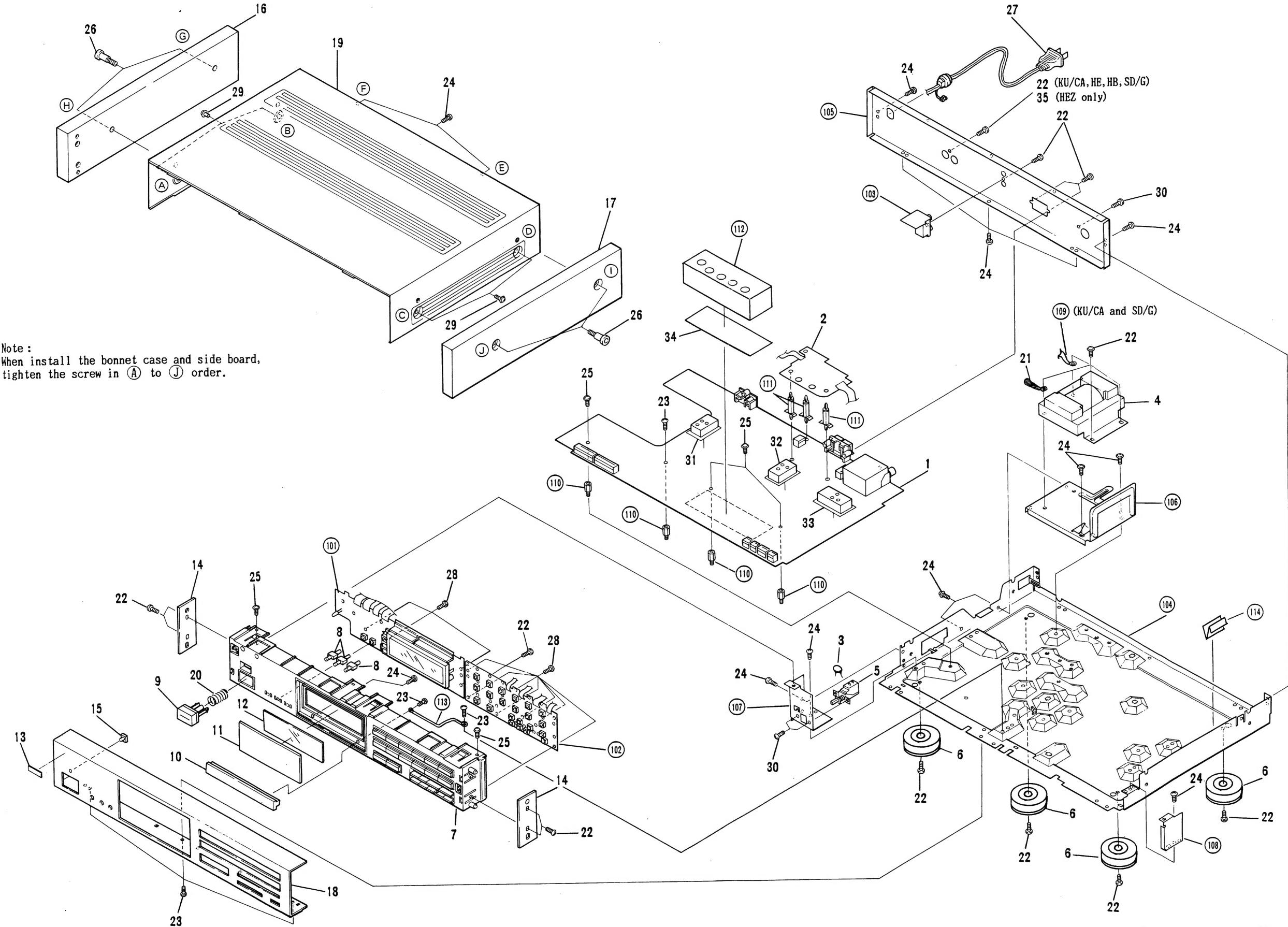
**11 STATION CALL switches**

Use these switches to preset stations and to receive already preset stations.

**12 Operation Display**

- (A) Shows reception band and frequency.
- (B) When the TUNING MODE switch is set to AUTO 1-3, the mark ▼ above the signal indicator indicates the level set for automatic tuning.
- (C) Signal indicator
- (D) Lights up when a stereo broadcast is received.
- (E) Stays lit while muting is occurring.
- (F) Stays lit while the MPX MODE switch is set to MONO.
- (G) Flashes when the REC LEVEL CHECK switch is set to on.
- (H) Stays lit while the MPX MODE switch is set to Hi-Blend.
- (I) Shows the condition of the program memory mode.
- (J) Stays lit while the PROGRAM MEMORY ON/OFF switch is on.
- (K) Lights for about 5 seconds when the MEMORY switch is pressed.
- (L) Lights up when the station call selector switch is set to 13-24.
- (M) When a STATION CALL switch is pressed, it will show the corresponding channel number.

### 3. EXPLODED VIEW AND PARTS LIST



Parts Li  
Mark No

▲  
▲★  
▲★★

Extern

RN1  
RN2

E

A

## NOTES:

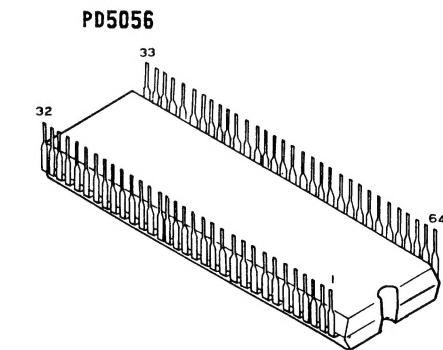
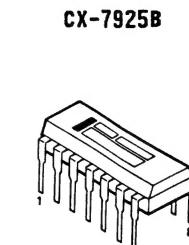
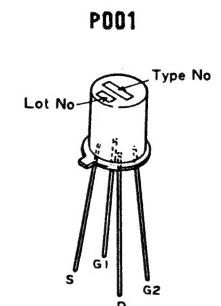
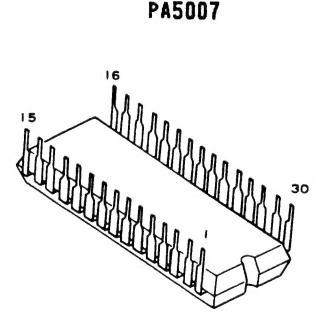
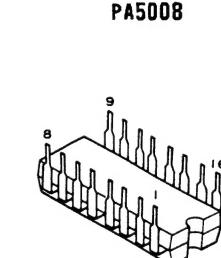
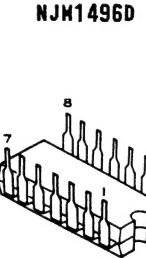
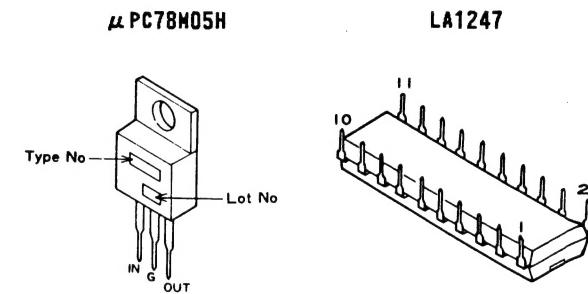
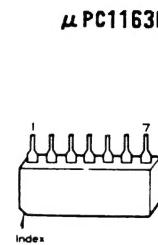
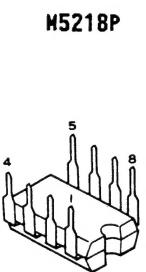
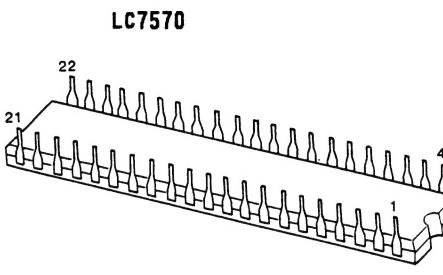
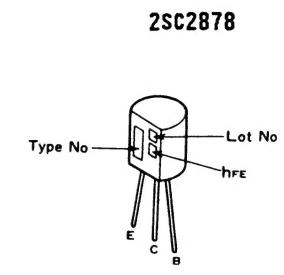
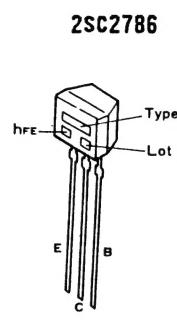
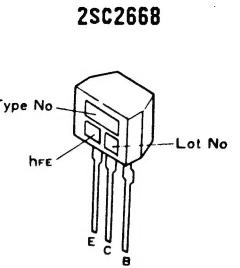
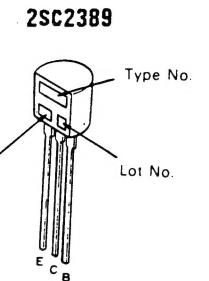
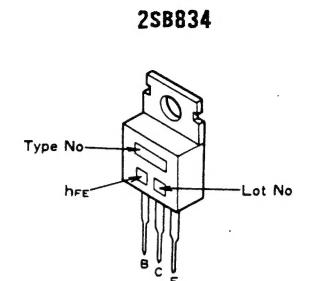
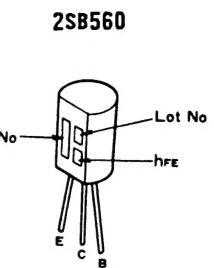
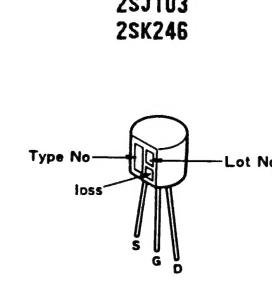
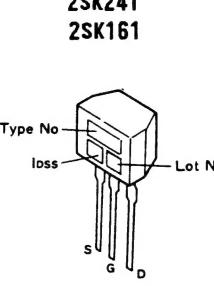
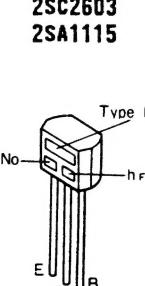
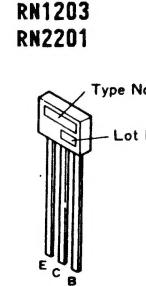
- Parts without part number cannot be supplied.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks  $\star\star$  and  $\star$ .
- $\star\star$  GENERALLY MOVES FASTER THAN  $\star$   
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- Parts marked by  $\circledcirc$  are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

## Parts List

Mark	No.	Part no.	Description	Mark	No.	Part no.	Description
	1	AWZ1568	TUNER assembly		25	ABA1011	Screw
	2	AWZ1570	AM assembly		26	ABA1032	Screw
$\Delta$	3	ACE-501	Ceramic capacitor (0.01 $\mu$ F/AC250V, C409)	$\Delta$	27	ADG-088	AC power cord
$\Delta \star$	4	ATT1043	Power transformer (T901)		28	BBZ26P080PMC	Screw
$\Delta \star\star$	5	ASG-541	Push switch (POWER, S901)		29	FBT40P080FZK	Screw
	6	AMR1047	Leg assembly		30	VMZ30P060FCU	Screw
	7	AMB1222	Panel base assembly		31	AWZ1576	DET VCO assembly
	8	AAD1190	Tact knob B (PROGRAM MEMORY)		32	AWZ1577	IF VCO assembly
	9	AAD1197	Power knob (POWER)		33	AWZ1580	FRONT END OSC assembly
	10	AAH1029	Aluminum sash		34	AWZ1579	IF MODULE assembly
	11	AAK1298	Acrylic panel		35	ABA1035	Screw (HEZ only)
	12	AAK1300	FL filter				FL assembly
	13	AAM1001	Name plate				SW assembly
	14	AAP1064	Side sash				REMOCON assembly
	15	AMR1160	LED lens				Chassis
	16	AMS1015	Side board L				Rear panel
	17	AMS1016	Side board R				Transformer frame
	18	ANB1128	Front panel				Front panel holder A
	19	ANE1087	Bonnet case				Front panel holder B
	20	ABH1033	Coil spring A				Earth lead
	21	AEC-093	Binder				PCB holder
	22	ABA-298	Screw				
	23	ABA1006	Screw				PCB support
	24	ABA1009	Screw				Shield cover
							Earth lead
							Earth leader

B

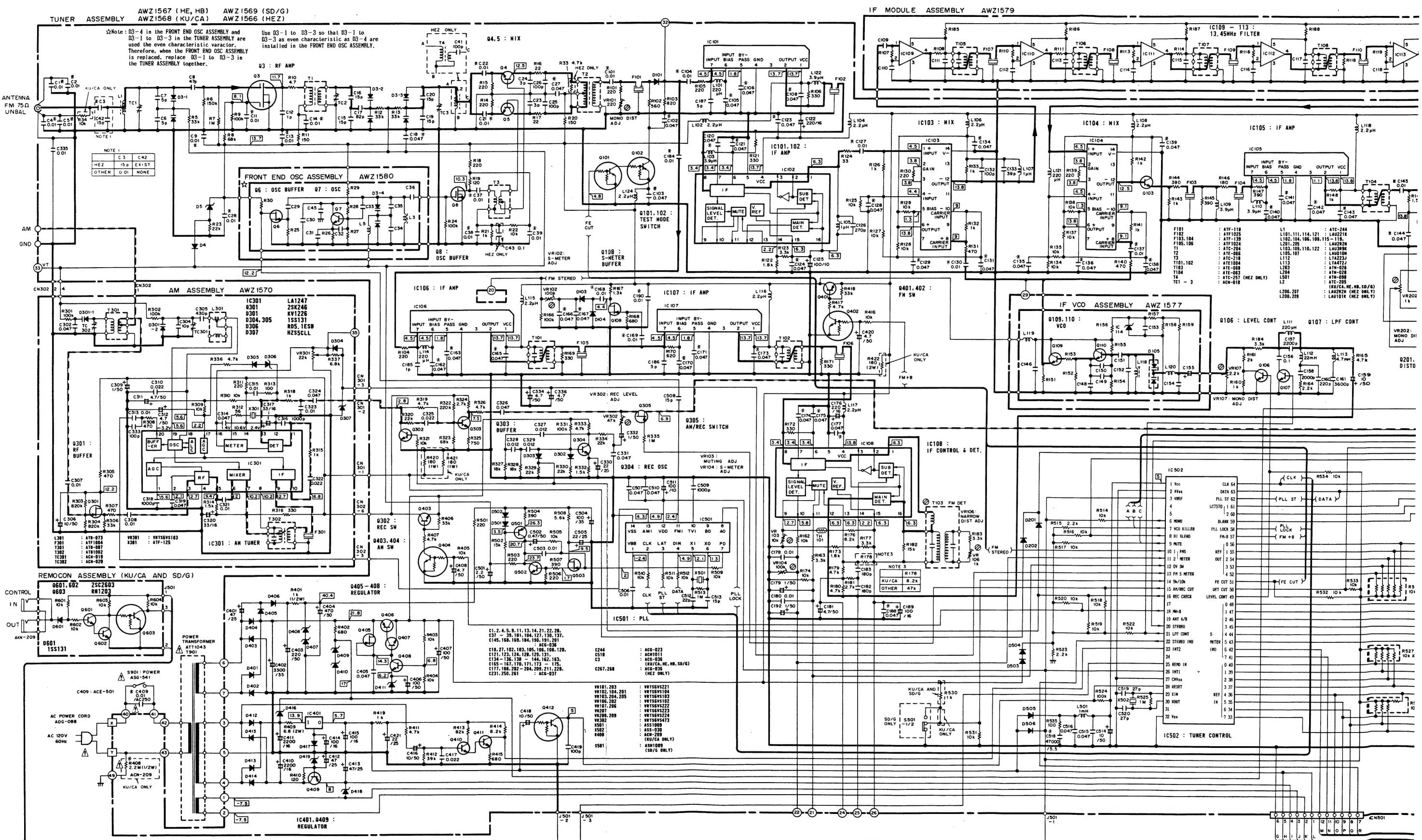
## External Appearance of Transistor and ICs



C

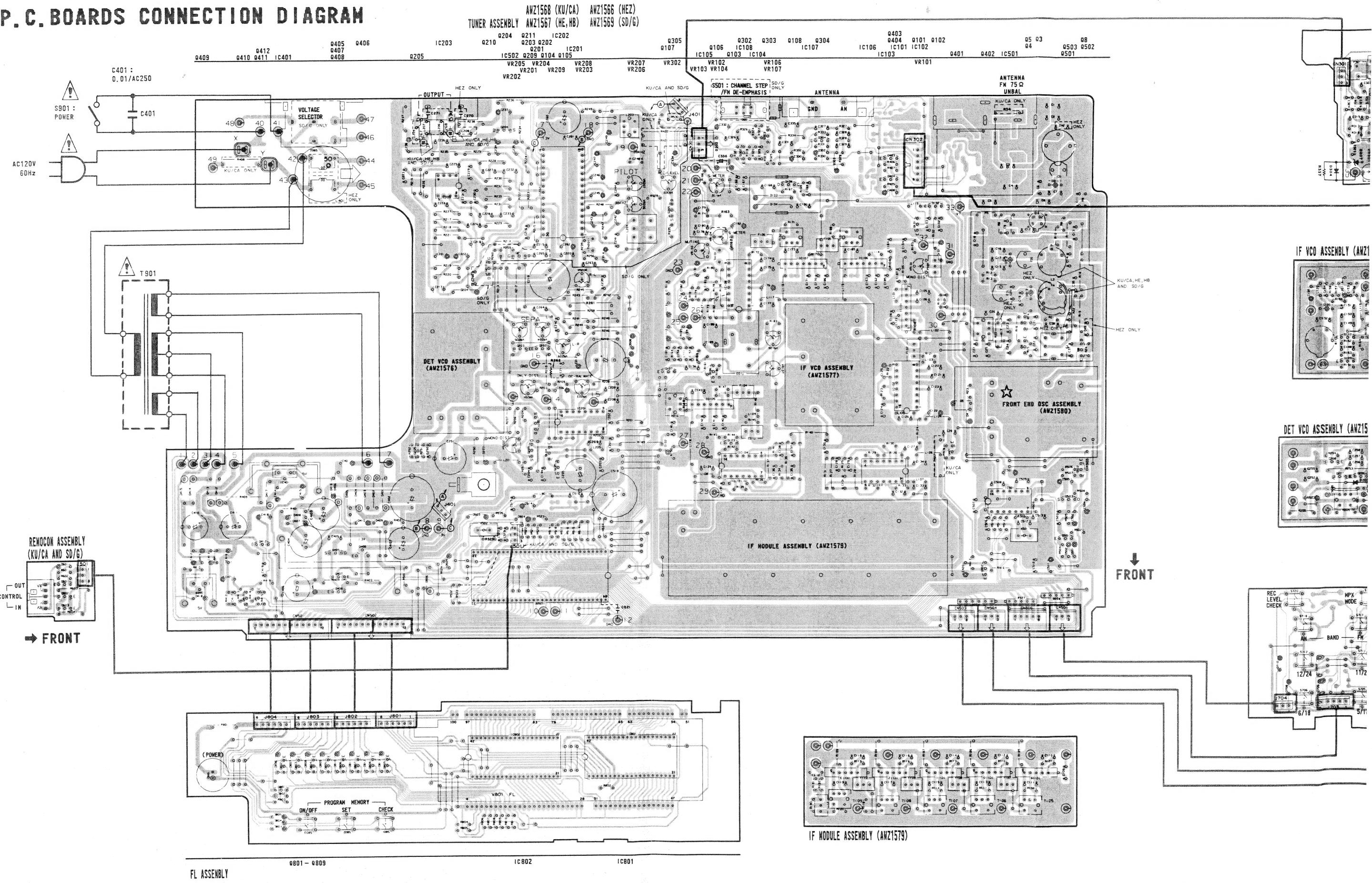
D

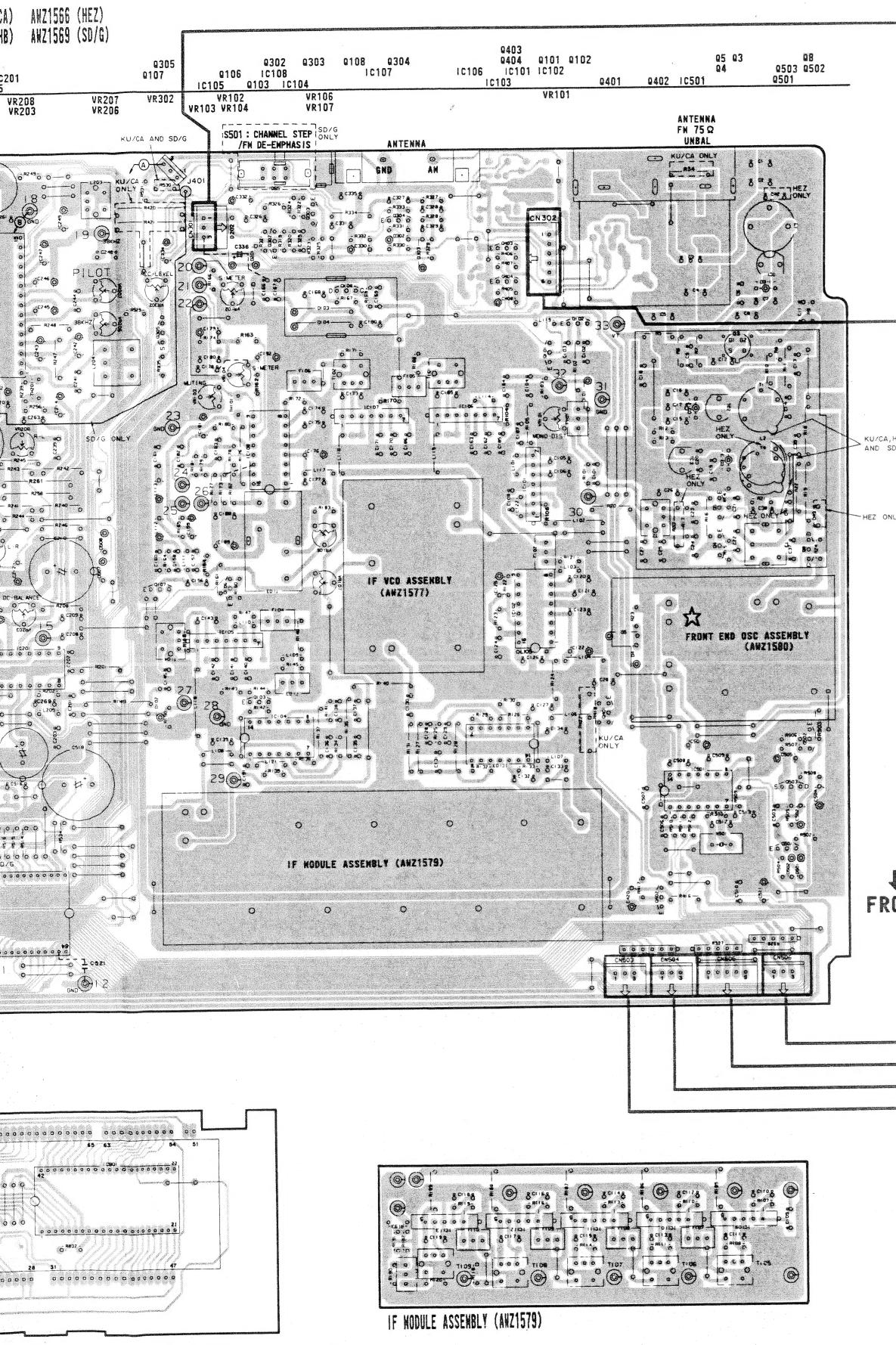
## 4. SCHEMATIC DIAGRAM



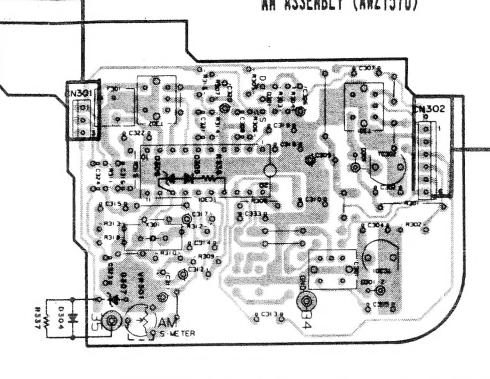


# 5. P.C. BOARDS CONNECTION DIAGRAM

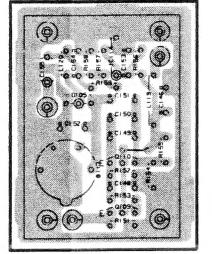




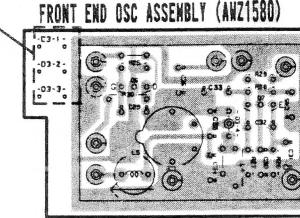
AN ASSEMBLY (ANZ1570)



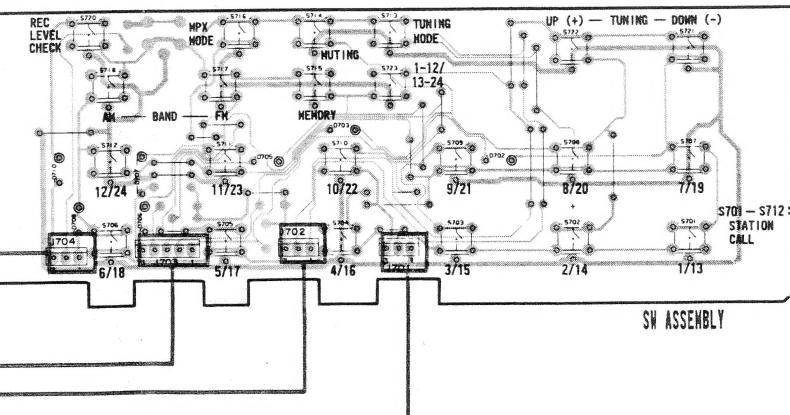
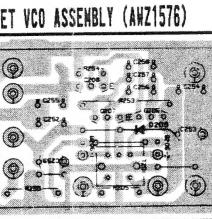
IF VCO ASSEMBLY (ANZ1577)



FOR TUNER ASSEMBLY



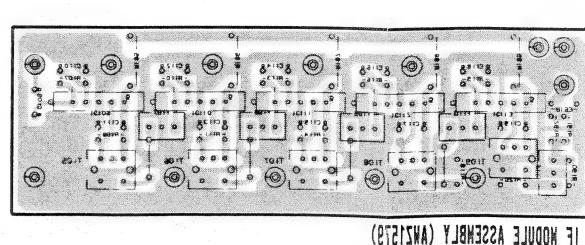
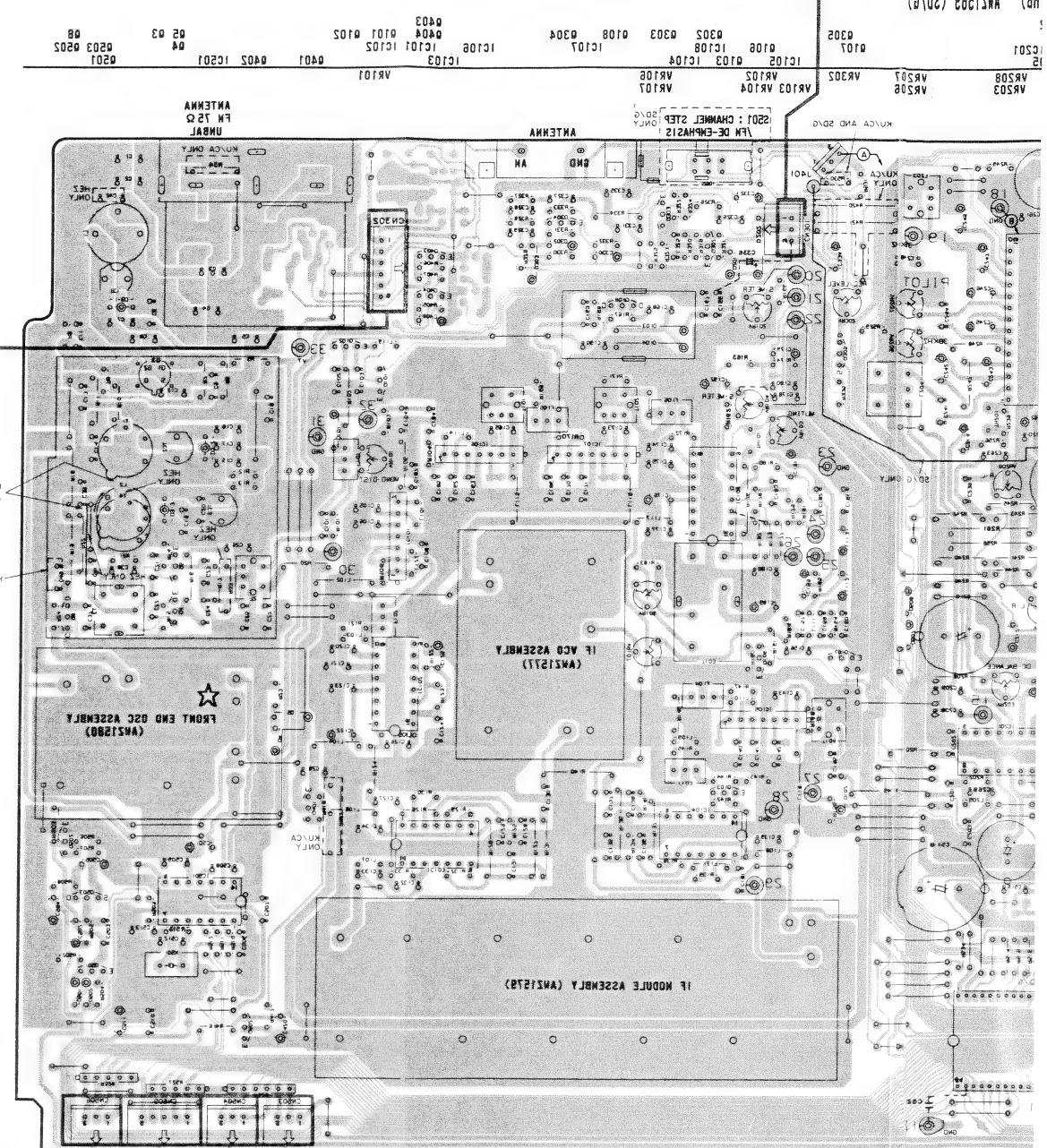
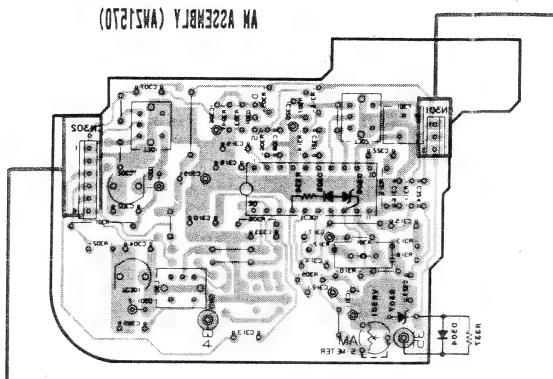
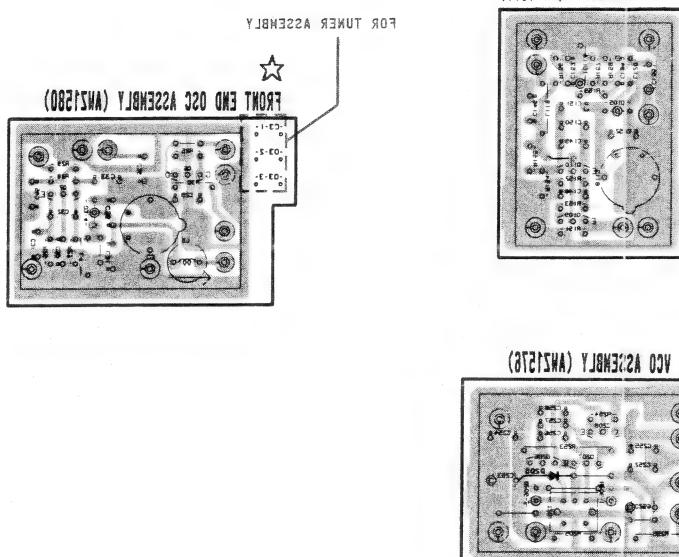
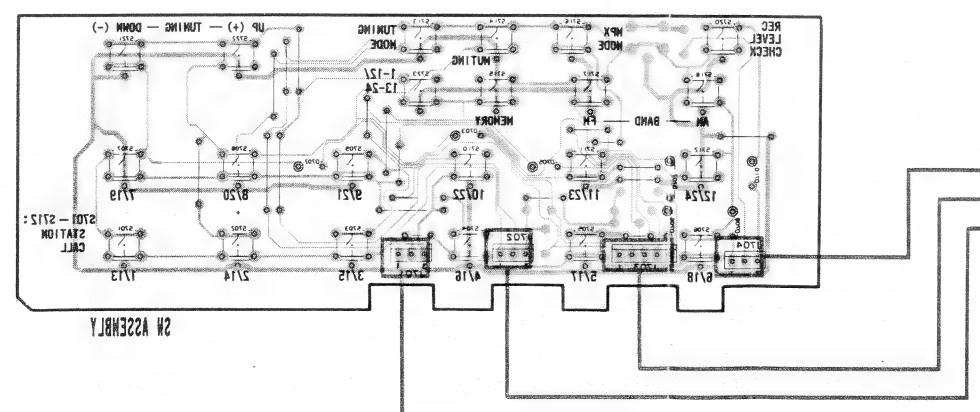
FRONT END OSC ASSEMBLY (ANZ1580)



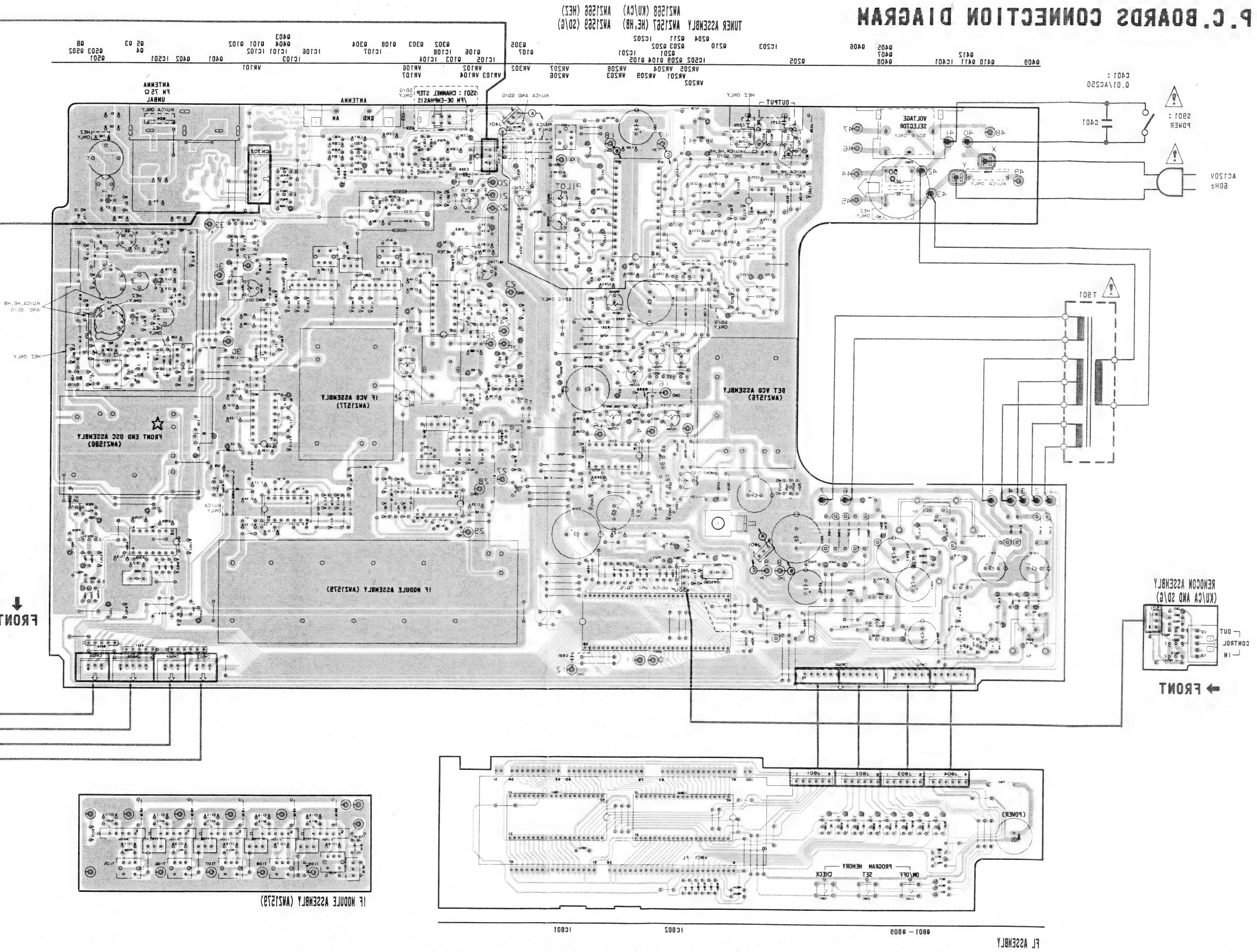
NOTE  
1. This PC-B connection diagram is derived from the parts mounting sizes.  
2. The parts which have been numbered are also listed in the parts list.  
3. The parts which have been numbered are also listed in the parts list.

PC.B. battery system		Corresponding part symbol	Part Name
			Capacitor (Mu-metalloy)
			Capacitor (Poisotia)
			Resistor
			Diode
			Diode
			Resistor
			Diode
			Diode
			Transistor
			Resistor
			Diode
			Diode
			Diode
			Diode

Part Name	PC-B. better alternative Indication	Qdose
IC		
Swiftp		
Relax		
RY		
Coil		
Fifte		
Arthritic lesions of		
Arthritic lesions of		



### **P.C. BOARDS CONNECTION DIAGRAM**



## 6. ELECTRICAL PARTS LIST

## NOTES:

- Parts without part number cannot be supplied.
- Parts marked by "◎" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The △ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
- ★★ GENERALLY MOVES FASTER THAN ★
- This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.
- Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).
- 560Ω 56×10<sup>1</sup> 561 ..... RD1/4PS561J
- 47kΩ 47×10<sup>3</sup> 473 ..... RD1/4PS473J
- 0.5Ω 0R5 ..... RN2H0R5K
- 1Ω 010 ..... RS1P010K
- Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).
- 5.62kΩ 562×10<sup>1</sup> 5621 ..... RN1/4SR5621J

## Miscellaneous Parts

Mark	Symbol & Description	Part No.
	REMOCON assembly	
	FL assembly	
	TUNER assembly	AWZ1568
	SW assembly	
	AM assembly	AWZ1570
	DET VCO assembly	AWZ1576
	IF VCO assembly	AWZ1577
	FRONT END OSC assembly	AWZ1580
	IF MODULE assembly	AWZ1579
△	C409 Ceramic capacitor (0.01/AC250V)	ACE-501
△	L901 Loop antenna assembly	ATB-086
△★	T901 Power transformer	ATT1043
△★★	S901 Push switch (POWER)	ASG-541
△	AC power cord	ADG-088

## REMOCON Assembly

Mark	Symbol & Description	Part No.
★★	Q603	RN1203
★★	Q601, Q602	2SC2603
★	D601	ISS131
	RESISTORS	
	Mark Symbol & Description	Part No.
	R601-R604	RD1/8PM103J
	OTHERS	
	Mark Symbol & Description	Part No.
	2P Mini jack (CONTROL)	AKN-209

## TUNER Assembly (AWZ1568)

SEMICONDUCTORS		Part No.	SEMICONDUCTORS		Part No.	CAPACITORS		Part No.
Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.
★★	TH101, TH201 Thermistor	TH103-2	★★	L103, L109, L110, L122	LAU3R9K	C5		
★★	IC501	CX-7925B	★★	Axial inductor		C5		
★★	IC203	M5218P	★★	L112 Inductor	LTA223J	C1		
★★	IC103, IC104	NJM1496D	★★	L113 Inductor	LTA472J	C2		
★★	IC202	PA5007	★★	F101 FM Ceramic filter	ATF-118	C1		
★★	IC102, IC108, IC201	PA5008	★★	F103, F104 FM IF filter	ATF-139	C4		
★★	IC502	PD5056	★★	F105, F106 Ceramic filter	ATF1024	C1		
★★	IC101, IC105-IC107	μPC1163H	★★	F102 FM IF filter	ATF1025	C4		
★★	IC401	μPC78M05H	★★	T1 FM RF transformer	ATC-204	C5		
★★	Q3	P001	★★	T3 FM Balun transformer	ATC-218	C2		
★★	Q101, Q105, Q402, Q404, Q412	RN1203	★★	T104 FM Matching transformer	ATE-063	C1		
★★	Q102, Q104	RN2201	★★	T2 FM IF transformer	ATE-066	C4		
★★	Q403, Q501	2SA1115	★★	T103 FM Detector transformer	ATE-068	C4		
★★	Q401	2SB560	★★	T101, T102	ATE1004	C1		
★★	Q406, Q409	2SB834	★★	FM Matching transformer		C2		
★★	Q205	2SC2389	★★	CAPACITORS		C2		
★★	Q302-Q304, Q407, Q408, Q410, Q411, Q502	2SC2603	Mark	Symbol & Description	Part No.	C24		
★★	Q103	2SC2668	★★	TC1-TC3 Trimmer	ACM-018	C25		
★★	Q4, Q5	2SC2786	★★	C244 (390p/DC50V)	ACG-023	C40		
★★	Q106, Q107, Q202, Q203	2SC2878	★★	C1-C5, C9, C11, C13, C14, C21, C22, C28, C37-C39, C101, C104,	ACG-036	C1		
★★	Q201	2SJ103	★★	C127, C130, C137, C145, C168,		C40		
★★	Q8, Q108	2SK241	★★	C169, C184, C190, C191, C201		C20		
★★	Q204, Q209, Q305, Q405, Q503	2SK246	★★	C267, C268 (0.01/DC25V)		C17		
★★	D411	HZS6C2L	★★	C18, C27, C102, C103, C105, C106, C108, C120, C121, C123, C124,	ACG-037	C40		
★	D409, D410, D416	HZS9A3L	★★	C128, C129, C131, C134-C136,		C21		
★	D408	RD13EB	★★	C138-C144, C162, C163,		C22		
★	D407	RD15EB	★★	C165-C167, C170, C171,		C22		
★	D418	RD2.2ESB	★★	C173-C175, C177, C188,		C15		
★	D5	RD7.5EB	★★	C202-C204, C209, C211, C220, C231, C250, C261		C32		
★	D419	RD8.2ESB	★★	(0.047/DC25V)		C32		
★	D203, D204	RD8.2FB	★★			C23		
★	D412-D415, D417, D506	S5566	★★			C32		
★	D4, D201, D202, D302, D303, D501-D505, D507, D508	ISS131	★★			C20		
★	D101, D102	1SS85	★★			C44		
★	D401-D406	10DF2FD	★★			C41		
★	D103, D104	2-1K261	★★			C33		
	COILS, FILTERS AND TRANSFORMERS		★★			C50		
Mark	Symbol & Description	Part No.	★★	C182, C183	CCCSL181J50	C50		
			★★	C160	CCCSL221J50	C22		
			★★	C126	CCCSL271J50	C23		
			★★	C133	CCCSL390J50	C15		
			★★	C12	CCDCH010C50	C21		
	L2 FM RF Coil	ATC-205	★★	C23, C24	CCDCH030C50	C21		
	L1 FM ANT Coil	ATC-244	★★	C508, C513	CCDCH150J50	C22		
	L501 Inductor (1mH)	ATH-098	★★	C512	CCDCH220J50	C16		
	L203 Coil (38kHz)	ATM-026	★★	C519, C520	CCDCH270J50	C22		
	L204 Coil (19kHz)	ATM-028	★★	C8	CCDCH470J50	C24		
	L105, L107 Axial inductor	LAU010M	★★	C25, C26	CCDRH101J50	C24		
	L102, L104, L106, L108, L115-L117, L123, L124, L201, L205 Axial inductor	LAU2R2M	★★	C6, C7	CCDSH050C50	C26		
	L101, L111, L114, L121 Axial inductor	LAU221K	★★	C15, C16, C19, C20	CCDSH150J50	C23		
			★★	C333	CCDSL101J50	C23		
			★★	C17	CCDSL820J50	C23		

**TUNER Assembly (AWZ1568)**

SEMI CONDUCTORS			RESISTORS						
Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.				
★★ TH101, TH201	Thermistor	TH103-2	L103, L109, L110, L122	LAU3R9K	C501	CEANL2R2M50	★ VR106, VR202 Semi-fixed (1kΩ)	VRTS6VS102	
★★ IC501		CX-7925B	Axial inductor		C502	CEASR47M50	★ VR103, VR204, VR205	VRTS6VS103	
★★ IC203		M5218P	L112 Inductor	LTA223J	C179, C192, C206, C332	CEAS010M50	Semi-fixed (10kΩ)		
★★ IC103, IC104		NJM1496D	L113 Inductor	LTA472J	C243	CEAS1R5M50	★ VR102, VR104, VR201	VRTS6VS104	
★★ IC202		PA5007	F101 FM Ceramic filter	ATF-118	C159, C242, C246, C247, C416, C418, C514	CEAS100M50	Semi-fixed (100kΩ)		
★★ IC102, IC108, IC201		PA5008	F103, F104 FM IF filter	ATF-139			★ VR101, VR203 Semi-fixed (220Ω)	VRTS6VS221	
★★ IC502		PD5056	F105, F106 Ceramic filter	ATF1024			★ VR107, VR206 Semi-fixed (2.2kΩ)	VRTS6VS222	
★★ IC101, IC105-IC107		μPC1163H	F102 FM IF filter	ATF1025			★ VR207 Semi-fixed (22kΩ)	VRTS6VS223	
★★ IC401		μPC78M05H	T1 FM RF transformer	ATC-204			★ VR208, VR209 Semi-fixed (220kΩ)	VRTS6VS224	
★★ Q3		P001	T3 FM Balun transformer	ATC-218			★ VR302 Semi-fixed (47kΩ)	VRTS6VS473	
★★ Q101, Q105, Q402, Q404, Q412		RN1203	T104 FM Matching transformer	ATE-063			R408 Carbon composition resistor (2.2M/1/2W)	ACN-209	
★★ Q102, Q104		RN2201	T2 FM IF transformer	ATE-066			R527, R528	RA4S103J	
★★ Q403, Q501		2SA1115	T103 FM Detector transformer	ATE-068			R526 Resistor array (10k×4)	RA5S103J	
★★ Q401		2SB560	T101, T102	ATE1004			R526 Resistor array (10k×5)		
★★ Q406, Q409		2SB834	FM Matching transformer				R206, R207, R210-R213, R216-R235, R237, R238, R240-R243, R258, R261	RDR1/4PM□□□J	
★★ Q205		2SC2389	<b>CAPACITORS</b>				R34, R250, R401	RD1/2PM□□□J	
★★ Q302-Q304, Q407, Q408, Q410, Q411, Q502		2SC2603	Mark	Symbol & Description	Part No.		R11, R20, R236	RD1/4PM□□□J	
★★ Q103		2SC2668	TC1-TC3 Trimmer	ACM-018	C245	CEAS6R8M50	R208, R209, R214, R215, R248,	RN1/4PQ□□□F	
★★ Q4, Q5		2SC2786	C244 (390p/DC50V)	ACG-023	C251	CEXA222M16	R403, R404		
★★ Q106, Q107, Q202, Q203		2SC2878	C1-C5, C9, C11, C13, C14, C21, C22, C28, C37-C39, C101, C104, C127, C130, C137, C145, C168, C169, C184, C190, C191, C201	ACG-036	C404	CEXA471M50	R420, R421	RS1LMF181J	
★★ Q201		2SJ103	C267, C268 (0.01/DC25V)		C217, C218	CEYANP3R3M50	R409, R422	RS2LMF□□□J	
★★ Q8, Q108		2SK241			C189	CEYA101M16	Other resistors	RD1/8PM□□□J	
★★ Q204, Q209, Q305, Q405, Q503		2SK246							
★ D411		HZS6C2L	C18, C27, C102, C103, C105, C106, C108, C120, C121, C123, C124, C128, C129, C131, C134-C136, C138-C144, C162, C163, C165-C167, C170, C171, C173-C175, C177, C188, C202-C204, C209, C211, C220, C231, C250, C261	ACG-037	C406, C407	CEYA101M50	<b>OTHERS</b>		
★ D409, D410, D416		HZS9A3L	(0.047/DC25V)		C205, C260	CEYA102M16	Mark	Symbol & Description	Part No.
★ D408		RD13EB			C176	CEYA221M16			
★ D407		RD15EB			C403	CEYA221M50			
★ D418		RD2, 2ESB			C210, C219	CEYA222M16			
★ D5		RD7.5EB							
★ D419		RD8, 2ESB							
★ D203, D204		RD8, 2FB							
★ D412-D415, D417, D506		S5566							
★ D4, D201, D202, D302, D303, D501-D505, D507, D508		ISS131							
★ D101, D102		1SS85							
★ D401-D406		10DP2FD							
★ D103, D104		2-1K261							
<b>COILS, FILTERS AND TRANSFORMERS</b>									
Mark	Symbol & Description	Part No.	<b>SW Assembly</b>						
L2	FM RF Coil	ATC-205	C182, C183	CCCSL181J50	C236	CFTXA333J50	★ D702, D703, D705-D708, D710	1SS131	
L1	FM ANT Coil	ATC-244	C160	CCCSL221J50	C326	CFTXA473J50			
L501	Inductor (1mH)	ATH-098	C126	CCCSL271J50	C156	CFTXA104J50			
L203	Coil (38kHz)	ATM-026	C133	CCCSL390J50	C327-C329	CFTXA123J50			
L204	Coil (19kHz)	ATM-028	C12	CCDCH010C50	C325	CFTXA223J50			
L105, L107	Axial inductor	LAU010M	C23, C24	CCDCH030C50					
L102, L104, L106, L108, L115-L117, L123, L124, L201, L205	Axial inductor	LAU2R2M	C508, C513	CCDCH150J50	C225, C226	CFTXA103J50			
L101, L111, L114, L121	Axial inductor	LAU221K	C512	CCDCH220J50	C223, C224	CQDXA102J100			
Axial inductor			C519, C520	CCDCH270J50	C232, C233	CQDXA182J100			
			C8	CCDCH470J50	C158	CQDXA202J100			
					C157	CQDXA222J100			
					C215, C216	CQDXA242J100			
					C227, C228	CQDXA272J100			
					C161	CQDXA362J100			
					C229, C230	CQDXA472J100			
					C248	CQSA682J50			
					C241	CQSA821J50			
					C263, C264	CQSXAA331J160			
					C239, C240	CQSXAA561J160			

**AM Assembly (AWZ1570)****SEMICONDUCTORS**

Mark	Symbol & Description	Part No.
★★	IC301	LA1247
★★	Q301	2SK246
★	D301	KV1226
★	D304, D305	ISS131
★	D306	RD5.1ESB
★	D307	HZS5CLL

**COIL, FILTER AND TRANSFORMERS**

Mark	Symbol & Description	Part No.
	L301 AM OSC Coil	ATB-073
	F301 AM Ceramic filter	ATF1004
	T301 AM Antenna transformer	ATB-087
	T302 AM IF transformer	ATB1002

**CAPACITORS**

Mark	Symbol & Description	Part No.
	TC301	ACM-019
	TC302	ACM-020
	C304	CCDUJ100D50
	C309	CEAS010M50
	C306	CEAS100M50
	C317, C320	CEAS330M16
	C311, C312	CEAS4R7M50
	C323	CFTXA103J50
	C324	CFTXA473J50
	C316, C318	CKDVF102Z50
	C307, C308, C313, C315, C321	CKDVF103Z50
	C310, C322	CKDVF223Z50
	C302, C314, C319	CKDVF473Z50
	C305	QBSA431K50
	C333	CCDSL101J50

**RESISTORS**

Mark	Symbol & Description	Part No.
★	VR301 Semi-fixed (22kΩ) Other resistors	VRTS6VS223 RD1/8PM□□□J

**OTHERS**

Mark	Symbol & Description	Part No.
★	X301 Ceramic resonator	ATF-125

**DET VCO ASSEMBLY (AWZ1576)****IF VCO ASSEMBLY (AWZ1577)****★FRONT END OSC ASSEMBLY (AWZ1580)****IF MODULE ASSEMBLY (AWZ1579)**

There are not supplied parts above four assemblies.

**★Note :**

D3-4 in the FRONT END OSC ASSEMBLY and D3-1 to D3-3 in the TUNER ASSEMBLY are used the even characteristic varactor.

Therefore, when the FRONT END OSC ASSEMBLY is replaced, replace D3-1 to D3-3 in the TUNER ASSEMBLY together.

Use D3-1 to D3-3 so that D3-1 to D3-3 as even characteristic as D3-4 are installed in the FRONT END OSC ASSEMBLY.

## 7. ADJUSTMENTS

### AM Section Adjustments

- Wire as shown in Fig. 7-1
- Set the AM key to ON and the REC LEVEL CHECK key to OFF.

Step	AM SG (400Hz, 30% de modulation)		F-91 frequency indication	Adjustment point	Adjustments			
	Frequency	Level			Standard			
1	No signal		530kHz (531kHz) <sup>*1</sup>	L301	Adjust so that the voltage between terminal 33 and ground is 2V ( $\pm 0.3V$ ).			
2			1,700kHz (1,602kHz) <sup>*1</sup>	TC301	Adjust so that the voltage between terminal 33 and ground is 24.5V ( $\pm 0.5V$ ).			
3	Repeat steps 1 and 2 until both ground voltage standards are satisfied.							
4	Mechanically set VR301 to the midpoint.							
5	600kHz (603kHz) <sup>*1</sup>	50 – 80dB	600kHz (603kHz) <sup>*1</sup>	T301	Maximize the voltage between terminal 35 and ground.			
6	1,400kHz (1,395kHz) <sup>*1</sup>	50 – 80dB	1,400kHz (1,395kHz) <sup>*1</sup>	TC302				
7	Repeat steps 5 and 6 until the maximum voltage standard is satisfied in both steps.							
8	600kHz (603kHz) <sup>*1</sup>	100dB	600kHz (603kHz) <sup>*1</sup>	VR301	Adjust so that the voltage between terminal 35 and ground is 4.9V ( $\pm 0.1V$ ). <sup>*2</sup>			

\*1: The frequency in the parenthesis is the frequency at 9kHz STEP (HE and HB types).

\*2: Do not let the voltage of terminal 35 exceed 5.2V.

### FM Section Adjustment

Note: The adjustment method of this FM section is simple throughout.

- Wire as shown in Fig. 7-2
- Set the FM key to ON, and the REC LEVEL CHECK and MUTING keys to OFF.

Step	FM SG (1kHz, $\pm 75$ kHz deviation)		F-91 frequency indication	Adjustment point	Adjustments	
	Frequency	Level			Standard	
1	No signal		108MHz	L3	Adjust so that the voltage between terminal 33 and ground is 23.5V ( $\pm 0.2V$ ).	
2			87.5MHz	...	Confirm that the voltage between terminal 33 and ground is 7.5V ( $\pm 1.0V$ ).	
3	90MHz	40dB	90MHz	L1, T1, L2	Maximize the voltage between terminal 22 and ground.	
4	106MHz	40dB	106MHz	TC1–3		
5	Repeat steps 3 and 4 until both ground voltage standards are satisfied. Terminate the adjustment with step 4.					
6	106MHz	60dB	106MHz	T103—a	Set the voltage to OV for terminal 24 to 26.	
7	98MHz	18dB (Stereo modulation)*	98MHz	VR103	Adjust to the point just before muting is applied.	
8	98MHz	40dB	98MHz	—	Check the output level of the output terminal.	
9	Set the REC LEVEL CHECK key to ON.			VR302	At step 8, set the output level of the output terminal to $-6dB$ ( $\pm 1dB$ ).	

\* Stereo modulation: Main 1kHz, L-R,  $\pm 68.25$ kHz dev. pilot 19kHz,  $\pm 6.75$ kHz dev.

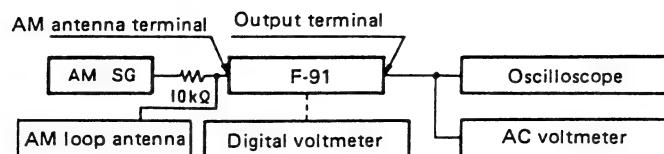


Fig. 7-1 AM adjustment wiring diagram

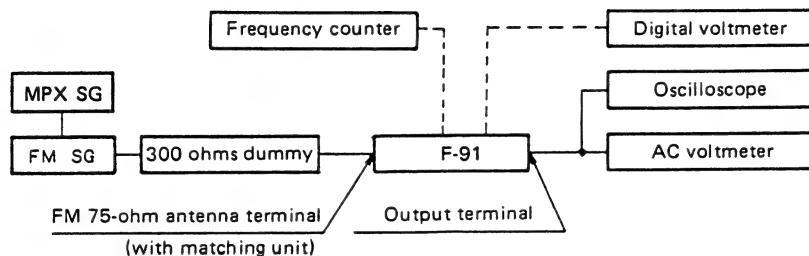


Fig. 7-2 FM adjustment wiring diagram

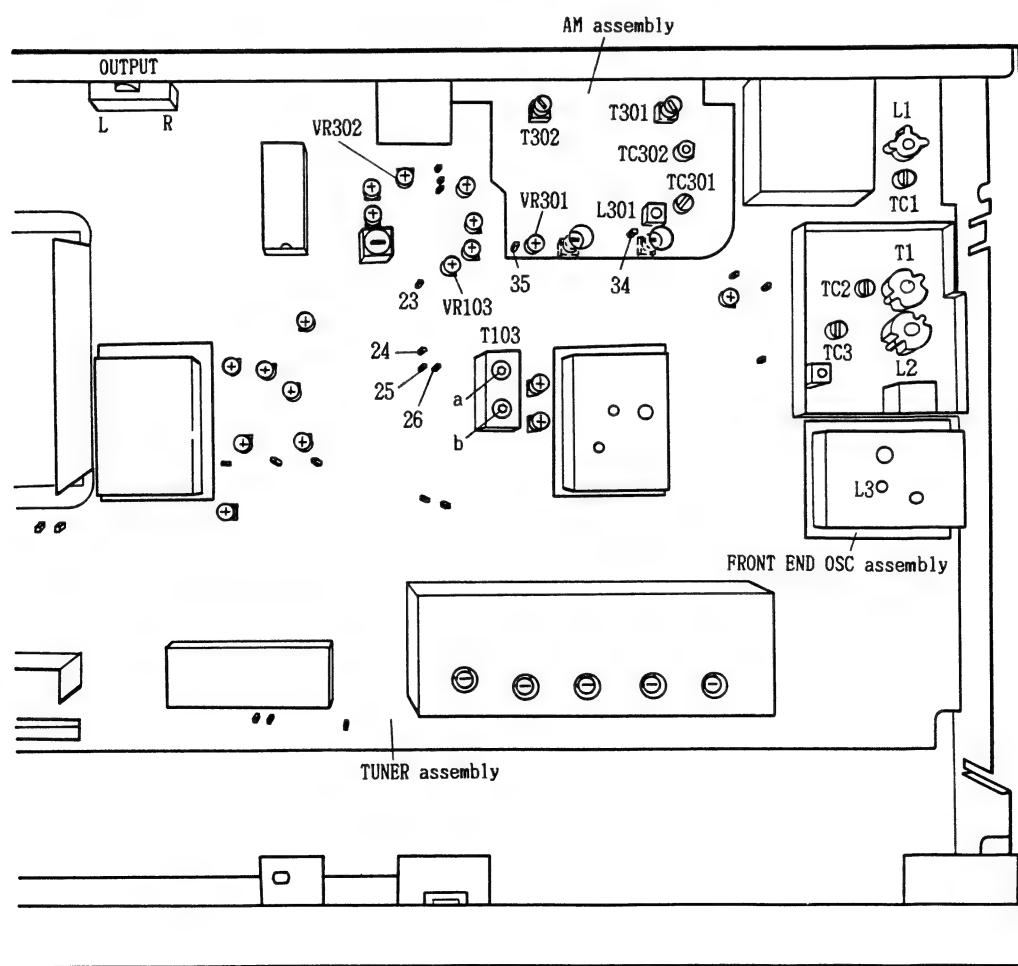


Fig. 7-3 Adjustment point

## 7. RÉGLAGE

### Réglages de la Section AM

- Effectuer le câblage comme indiqué sur la figure 7-1.
- Enclencher la touche AM et désenclencher la touche REC LEVEL CHECK.

Etape	AM SG (400Hz, 30% de modulation)		F-91 indication de fréquence	Point de réglage	Réglages			
	Fréquence	Niveau			Norme			
1	Aucun signal	530kHz (531kHz) <sup>*1</sup>	L301	TC301	Régler de telle manière que la tension entre la borne 33 et la terre soit égale à 2V ( $\pm 0,3V$ ).			
2		1.700kHz (1.602kHz) <sup>*1</sup>			Régler de telle manière que la tension entre la borne 33 et la terre soit égale à 24,5V ( $\pm 0,5V$ ).			
3	Répéter les étapes 1 et 2 jusqu'à ce que les deux normes de tension de terre soient satisfaites.							
4	Régler mécaniquement VR301 à mi-chemin.							
5	600kHz (603kHz) <sup>*1</sup>	50 – 80dB	600kHz (603kHz) <sup>*1</sup>	T301	Régler de telle manière que la tension entre la borne 35 et la terre soit au maximum.			
6	1.400kHz (1.395kHz) <sup>*1</sup>	50 – 80dB	1.400kHz (1.395kHz) <sup>*1</sup>	TC302				
7	Répéter les étapes 4 et 6 jusqu'à ce que la norme de tension maximum soit satisfaire dans les deux étapes.							
8	600kHz (603kHz) <sup>*1</sup>	100dB	600kHz (603kHz) <sup>*1</sup>	VR301	Régler de sorte que la tension entre la borne 35 et la masse soit de 4,9V ( $\pm 0,1V$ ). <sup>*2</sup>			

\*1: La fréquence entre les parenthèses est la fréquence à l'intervalle de 9kHz (modèles HE et HB).

\*2: Ne pas laisser la tension de la borne 35 dépasser 5,2V.

### Réglage de la Section FM

Remarque: La méthode de réglage de cette section FM est simple du début jusqu'à la fin.

- Effectuer le câblage comme indiqué dans la figure 7-2.
- Enclencher la touche FM et désenclencher les touches REC LEVEL CHECK et MUTING.

Etape	FM SG (1kHz, $\pm 75$ kHz de déviation)		Indication de fréquence de F-91	Point de réglage	Réglages	
	Fréquence	Niveau			Norme	
1	Aucun signal	108MHz	L3	...	Régler de telle manière que la tension entre la borne 33 et la terre soit égale à 23,5V ( $\pm 0,2V$ ).	
2		87,5MHz			Vérifier si la tension entre la borne 33 et la terre est égale à 7,5V ( $\pm 1,0V$ ).	
3	90MHz	40dB	90MHz	L1, T1, L2	Régler de telle manière que la tension entre la borne 22 et la terre soit au maximum.	
4	106MHz	40dB	106MHz	TC1 – 3		
5	Répéter les étapes 3 et 4 jusqu'à ce que les deux normes de tension de masse soit atteintes. Parachever le réglage avec l'étape 4.					
6	106MHz	60dB	106MHz	T103 – a	Régler la tension sur 0V pour les bornes 24 à 26.	
7	98MHz	18dB (Modulation stéréo)*	98MHz	VR103	Régler au point situé juste avant que l'assourdissement n'entre en service.	
8	98MHz	40dB	98MHz	—	Vérifier le niveau de sortie de la borne de sortie.	
9	Enclencher la touche REC LEVEL CHECK.			VR302	A l'étape 8, régler le niveau de sortie de la borne de sortie sur $-6$ dB ( $\pm 1$ dB).	

\* Modulation stéréo: Principale 1kHz, G-D,  $\pm 68,25$ kHz dév. pilote 19kHz,  $\pm 6,75$ kHz dév.

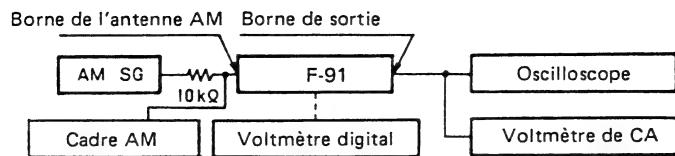


Fig. 7-1 Diagramme de câblage de réglage AM

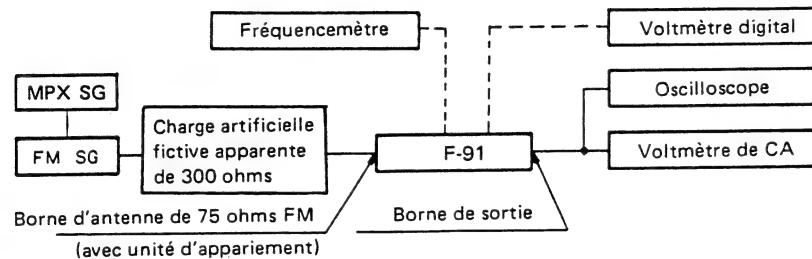


Fig. 7-2 Diagramme de câblage de réglage FM

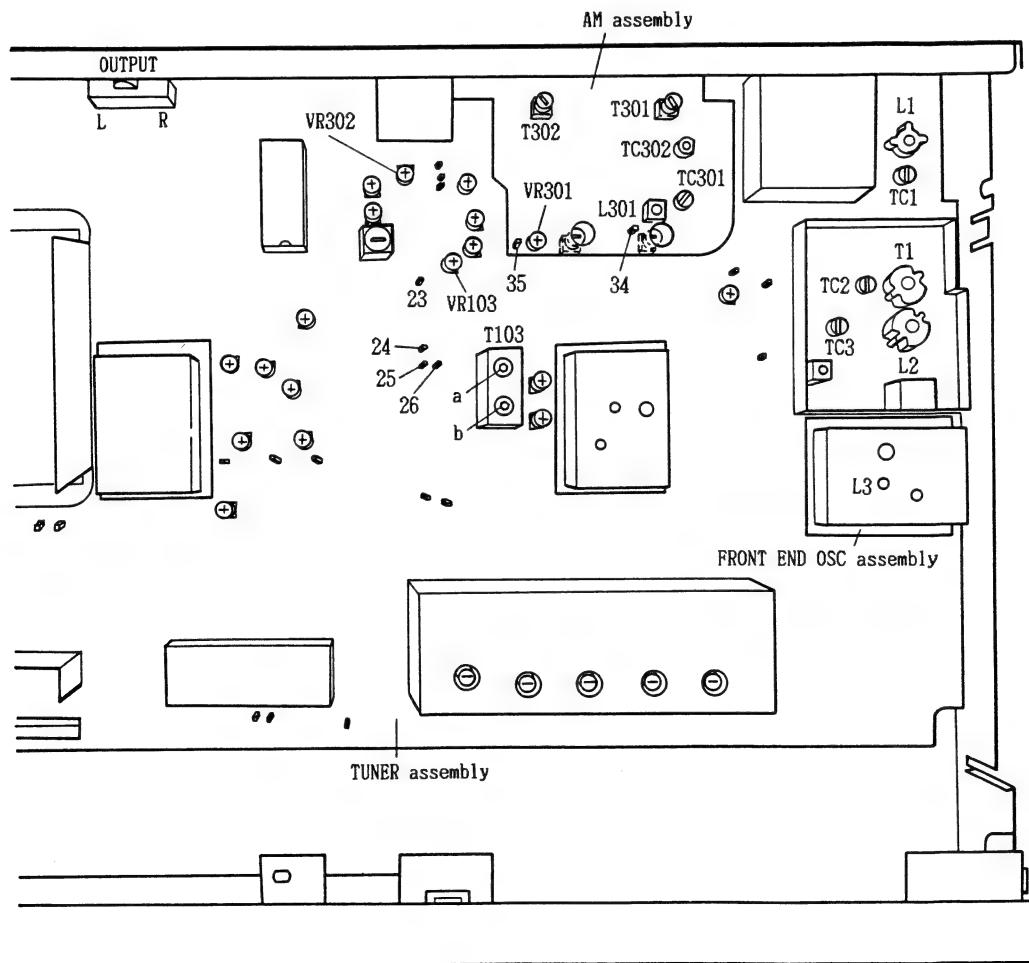


Fig. 7-3 Point de réglage

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## 7. AJUSTE

### Ajustes de la Sección AM

- Ejecutar el alambrado como se muestra en la figura 7-1.
- Ponga la tecla AM en ON, y la tecla REC LEVEL CHECK en OFF.

Paso	AM SG (400Hz, 30% de modulación)		F-91 indicación de frecuencia	Punto de ajuste	Ajustes		
	Frecuencia	Nivel			Estándar		
1	Ninguna señal		530kHz (531kHz) <sup>*1</sup>	L301	Ajustar de modo que el voltaje entre el terminal 33 y la tierra sea de 2V ( $\pm 0,3V$ ).		
2			1.700kHz (1.602kHz) <sup>*1</sup>	TC301	Ajustar de modo que el voltaje entre el terminal 33 y la tierra sea de 24,5V ( $\pm 0,5V$ ).		
3	Repetir los pasos 1 y 2 hasta que ambos estandares de voltaje de tierra sean satisfechos.						
4	Ponga VR301 mecánicamente en el punto central.						
5	600kHz (603kHz) <sup>*1</sup>	50 – 80dB	600kHz (603kHz) <sup>*1</sup>	T301	Ajustar de modo que el voltaje entre el terminal 35 y la tierra sea máximo.		
6	1.400kHz (1.395kHz) <sup>*1</sup>	50 – 80dB	1.400kHz (1.395kHz) <sup>*1</sup>	TC302			
7	Repetir los pasos 5 y 6 hasta que el estandar de voltaje máximo sea satisfecho en ambos pasos.						
8	600kHz (603kHz) <sup>*1</sup>	100dB	600kHz (603kHz) <sup>*1</sup>	VR301	Ajuste de forma que la tensión entre el terminal 35 y masa sea de 4,9V ( $\pm 0,1V$ ). <sup>*2</sup>		

\*1: La frecuencia entre paréntesis corresponde a 9kHz STEP (modelos HE y HB).

\*2: No deje que la tensión del terminal 35 sobrepase los 5,2V.

### Ajuste de la Sección FM

Nota: El método de ajuste de esta sección de FM es muy sencillo.

- Ejecutar el alambrado como se muestra en la figura 7-2.
- Ponga la tecla FM en ON, y las teclas REC LEVEL CHECK y MUTING en OFF.

Paso	FM SG (1kHz, $\pm 75$ kHz de desviación)		Indicación de frecuencia de F-91	Punto de ajuste	Ajustes	
	Frecuencia	Nivel			Estándar	
1	Ninguna señal		108MHz	L3	Ajustar de modo que el voltaje entre el terminal 33 y la tierra sea de 23,5V ( $\pm 0,2V$ ).	
2			87,5MHz	...	Verificar si el voltaje entre el terminal 33 y la tierra es de 7,5V ( $\pm 1,0V$ ).	
3	90MHz	40dB	90MHz	L1, T1, L2	Ajustar de modo que el voltaje entre el terminal 22 y la tierra sea máximo.	
4	106MHz	40dB	106MHz	TC1 – 3		
5	Repita los pasos 3 y 4 hasta obtener ambos valores de tensión. Termine el ajuste con el paso 4.					
6	106MHz	60dB	106MHz	T103 – a	Ajuste la tensión a 0V para los terminales 24 a 26.	
7	98MHz	18dB (Modulación estéreo)*	98MHz	VR103	Ajuste el punto justamente antes de que se aplique el silenciamiento.	
8	98MHz	40dB	98MHz	—	Compruebe el nivel de salida del terminal de salida.	
9	Ponga la llave REC LEVEL CHECK en ON.			VR302	En el paso 8, ajuste el nivel de salida del terminal de salida a $-6dB$ ( $\pm 1dB$ ).	

\* Modulación estéreo: Principal 1kHz, L-R, piloto de  $\pm 68,25$ kHz de desviación 19kHz, desviación de  $\pm 6,75$ kHz

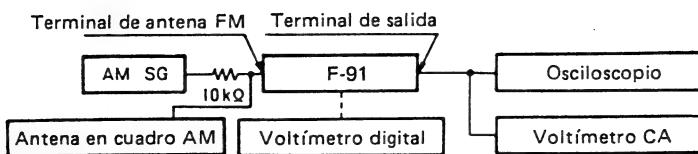


Fig. 7-1 Esquema de alambrado de ajuste AM

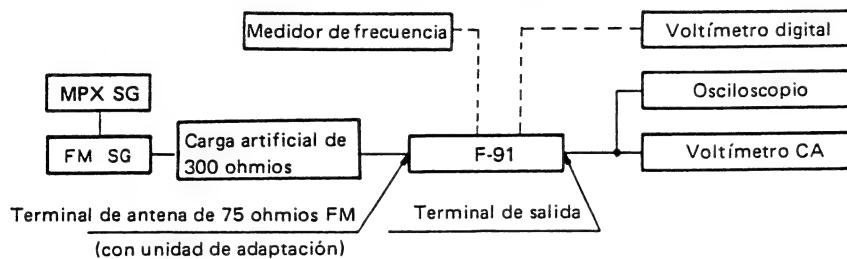


Fig. 7-2 Esquema de alambrado de ajuste FM

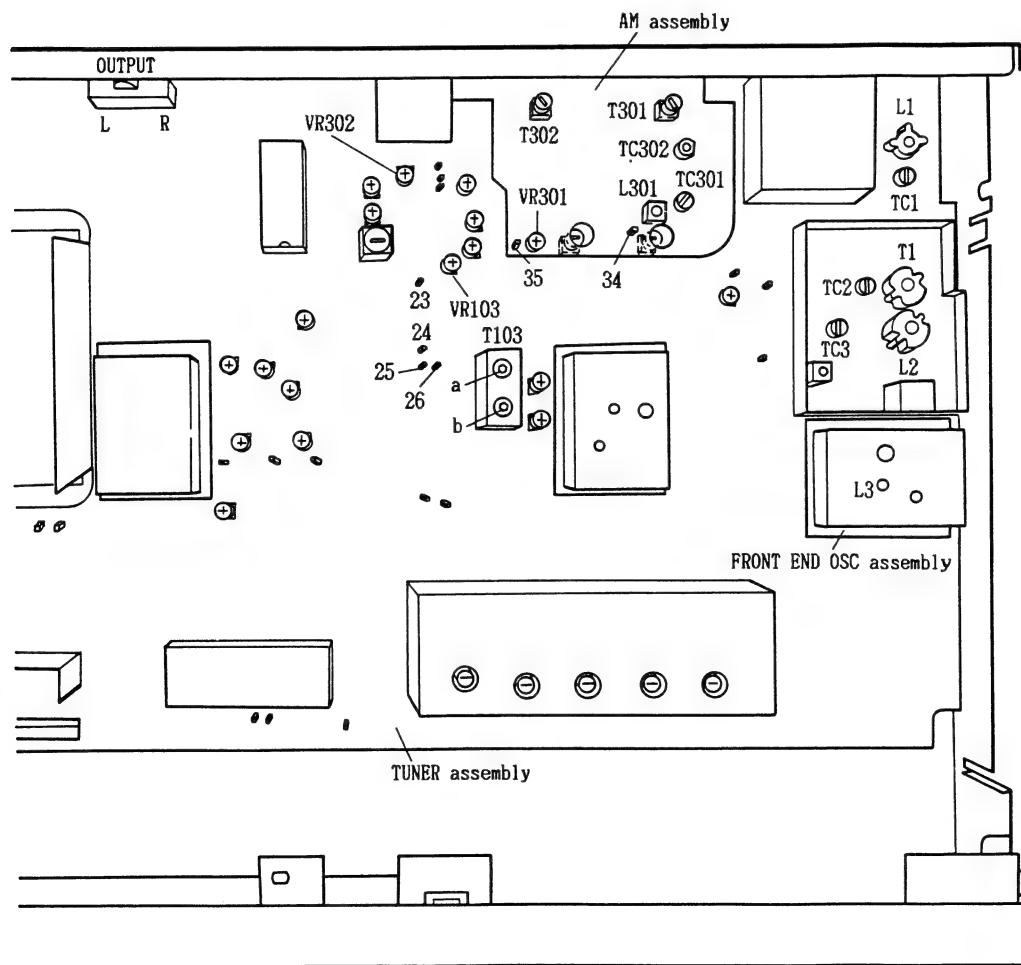
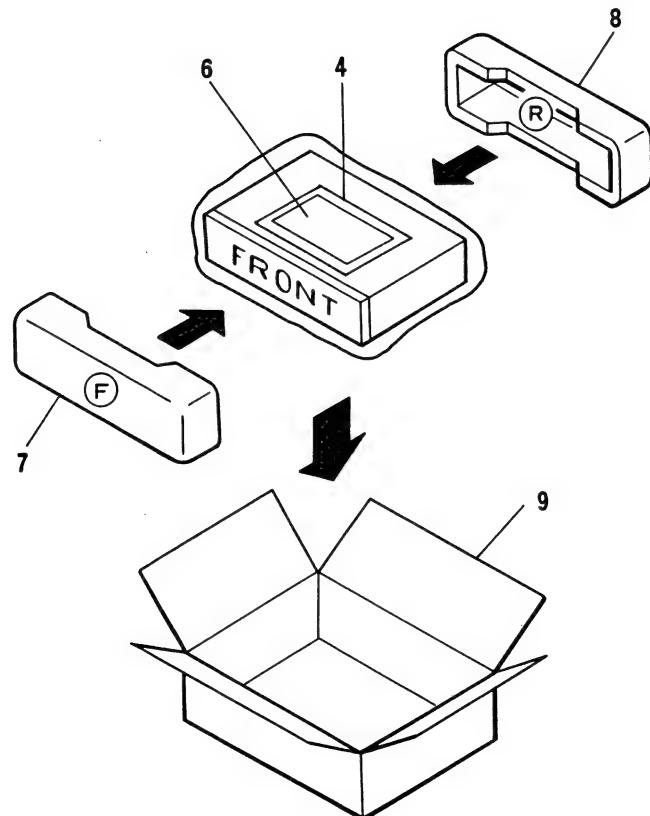
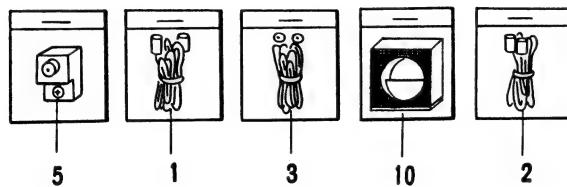


Fig. 7-3 Punto de ajuste

## 8. PACKING

### Parts List

Mark	No.	Part no.	Description
1	ADE-081		Connector cord with pin plug
2	ADE-085		Connector cord with mini plug
3	ADH-005		FM antenna
4	AHG-153		Catalog bag
5	AKX-080		Antenna adaptor
6	ARB1075		Operating instructions (English)
7	AHA1083		Front pad
8	AHA1084		Rear pad
9	AHD1259		Packing case
10	ATB-086		Loop antenna assembly (L901)



## 9. IC INFORMATION

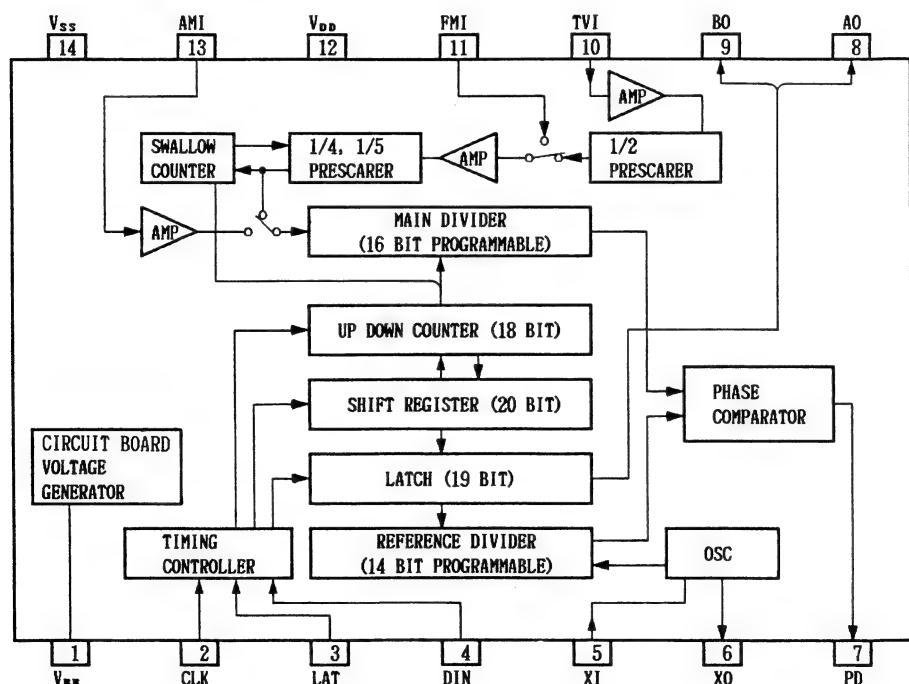
### ■ CX-7925B

TV/FM/AM frequency synthesizer PLL IC

#### • Pin Functions

Pin	Pin name	Function & Operation
1	$V_{BB}$	Circuit board terminal
2	CLK	Clock input for 20 bit series data input
3	LAT	Latch signal input of shift register input and Up/Down clock input
4	DIN	Data input and Up/Down mode change ("H" level:Up, "L" level:Down)
5	XI	Crystal oscillator connect terminal for reference signal generator (Max.:13MHz, Standard:4.0MHz)
6	XO	
7	PD	Phase comparator output (3 states)
8	A0	Exite control signal output/Unlock output (E/E MOS push-pull)
9	B0	Exite control signal output/data check (E/E MOS push-pull)
10	TVI	High frequency signal input (300MHz max.) including 1/2 prescaler
11	FMI	High frequency signal input (150MHz max.)
12	$V_{DD}$	Power supply (+5V)
13	AMI	High frequency signal input (40MHz max.)
14	$V_{SS}$	Ground

#### • Block Diagram



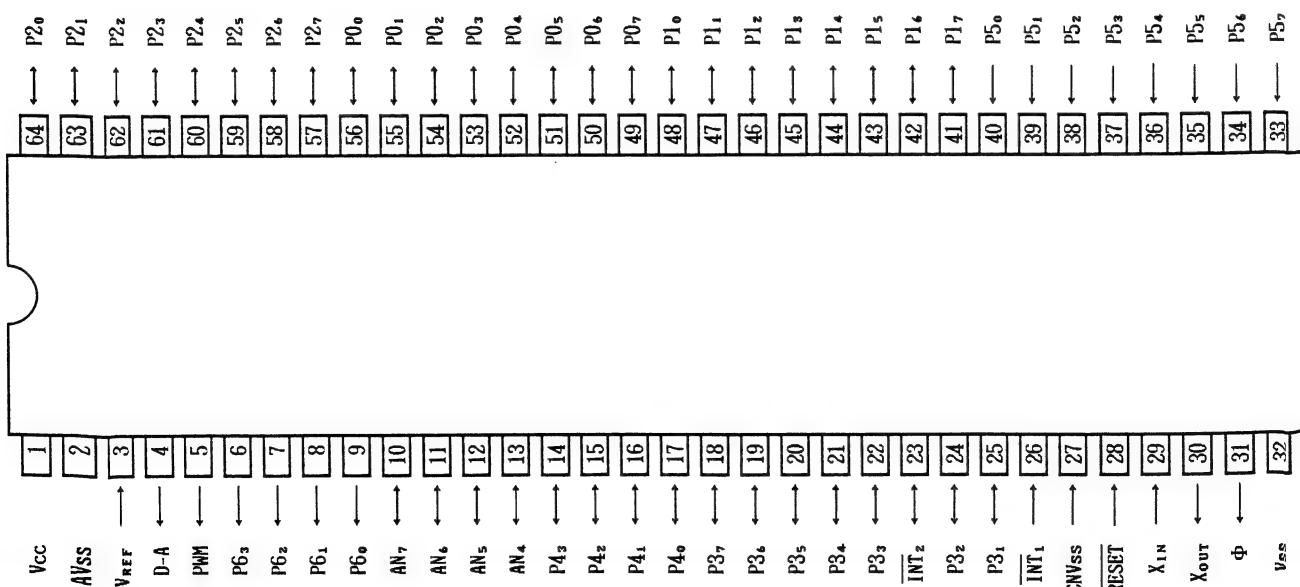
## ■ PD5056 (IC502)

## ● Pin Functions

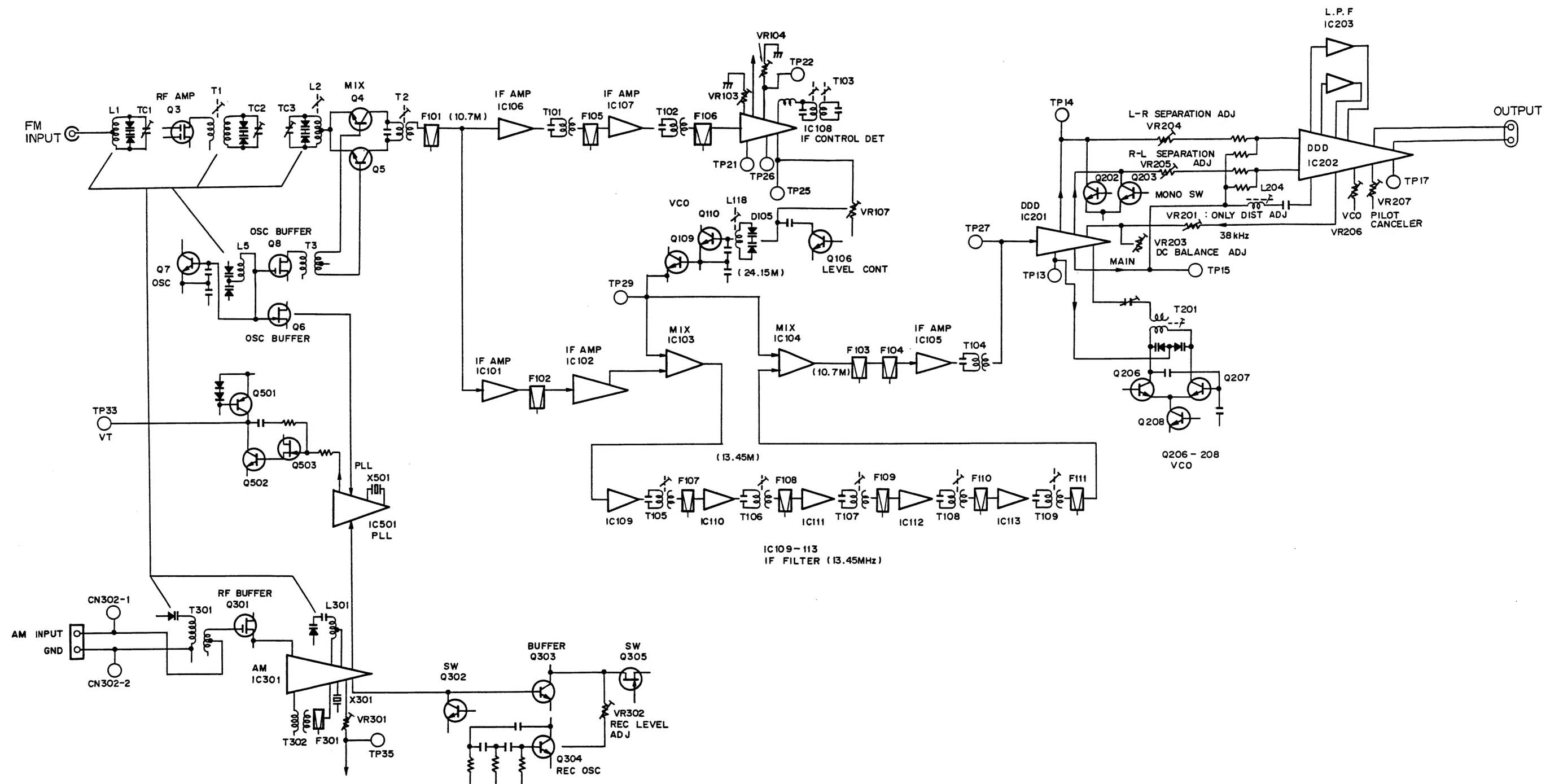
Pin	Pin name	Function & Operation	I/O	Active	Pin	Pin name	Function & Operation	I/O	Active
1	Vcc	Power supply (5V)	—	—	33	P5 <sub>7</sub>	KEY MATRIX INPUT	I	—
2	AVss	Analog ground (0V)	—	—	34	P5 <sub>6</sub>		I	—
3	V <sub>REF</sub>	Reference voltage input (5V)	—	—	35	P5 <sub>5</sub>		I	—
4	D-A	N.C.	—	—	36	P5 <sub>4</sub>		I	—
5	PWM	N.C.	—	—	37	P5 <sub>3</sub>		I	—
6	P6 <sub>3</sub>	Compulsion MONO	N	H	38	P5 <sub>2</sub>		I	—
7	P6 <sub>2</sub>	VCO KILLER (AM ON)	N	H	39	P5 <sub>1</sub>		I	—
8	P6 <sub>1</sub>	Hi-Blend	N	H	40	P5 <sub>0</sub>		I	—
9	P6 <sub>0</sub>	MUTE CONTROL	N	H	41	P1 <sub>7</sub>	S METER display (LSB)	N	L
10	AN <sub>7</sub>	FM S METER ② (A/D)	I	—	42	P1 <sub>6</sub>		N	L
11	AN <sub>6</sub>	FM S METER ① (A/D)	I	—	43	P1 <sub>5</sub>		N	L
12	AN <sub>5</sub>	O-VOLT MUTE (A/D)	I	—	44	P1 <sub>4</sub>		N	L
13	AN <sub>4</sub>	AM S METER (A/D)	I	—	45	P1 <sub>3</sub>		N	L
14	P4 <sub>3</sub>	9k/10k input (H=10k)	I	—	46	P1 <sub>2</sub>		N	L
15	P4 <sub>2</sub>	AM & REC CHECK CUT (AM or REC CHECK → H)	N	H	47	P1 <sub>1</sub>		N	L
					48	P1 <sub>0</sub>		N	L
16	P4 <sub>1</sub>	REC LEVEL CHECK	N	H	49	P0 <sub>7</sub>	LEVEL ADJ.CONT (O-VOLT MUTE ON=L)	N	L
17	P4 <sub>0</sub>	N.C.	N	H	50	P0 <sub>6</sub>	Test ② (DET) (L → test data load and FM +B OFF)	I	L
18	P3 <sub>7</sub>	MW +B CONTROL	N	H	51	P0 <sub>5</sub>	Test (L → test data load) (FE)	I	L
19	P3 <sub>6</sub>	ANTENNA A/B (A → H)	N	H	52	P0 <sub>4</sub>	KEY MATRIX OUTPUT	N	—
20	P3 <sub>5</sub>	STEREO information (L=STEREO)	I	—	53	P0 <sub>3</sub>		N	—
21	P3 <sub>4</sub>	LPP CONT (OV MUTE ON=H)	N	H	54	P0 <sub>2</sub>		N	—
22	P3 <sub>3</sub>	STEREO IND.	N	L	55	P0 <sub>1</sub>		N	—
23	INT <sub>2</sub>	Interrupt for back up (AC input)	I	—	56	P0 <sub>0</sub>		N	—
24	P3 <sub>1</sub>	N.C.	N	L	57	P0 <sub>7</sub>		N	—
25	P3 <sub>0</sub>	Remote control data input	I	—	58	P0 <sub>6</sub>	FM +B CONTROL	0	H
26	INT <sub>1</sub>	(5V Pull Up)	—	—	59	P0 <sub>5</sub>	PLL lock	—	—
27	CNVss	GND	—	—	60	P2 <sub>4</sub>	FL blank ("L" at Power ON)	0	H
28	RESET	Power ON reset	I	L	61	P2 <sub>3</sub>	LC7570 (No.2) enable line	0	—
29	X <sub>1N</sub>	Oscillator input (f <sub>0</sub> = 4MHz)	I	—	62	P2 <sub>2</sub>	LC7570 (No.1) enable line	0	—
30	X <sub>out</sub>	Oscillator output	0	—	63	P2 <sub>1</sub>	PLL enable line	0	—
31	Φ	N.C.	—	—	64	P2 <sub>0</sub>	Data line for serial data translator	0	—
32	Vss	GND	—	—			Clock line for serial data translator	0	—

I : CMOS INPUT    0 : CMOS OUTPUT    N : Nch OPEN

## ● Pin connections (Top view)



## 10. BLOCK DIAGRAM



## 11. CIRCUIT DESCRIPTION

### 11.1 New IF system principle

Fig.11-1 (a) shows the conventional IF system which band is wide position, and Fig.11-1 (b) shows the new IF system. Vertical line indicates the time variable of desired signal.

The line at right side of desired signal indicates undesired signal. Mountainous curve shows the amplitude characteristic of IF filter.

In the case of conventional system, signal pass through the filter without generate the distortion so that filter is wide. At this time, the system is affected by undesired signal.

In the case of new system, signal pass through directly so that narrow filter follow the signal. Besides, the system is not affected by undesired signal.

This system's filter is controlled by feedforward control, therefore, stability is very high and not oscillation.

This system organize the equivalent follow type filter so that input FM signal frequency controlled for center of the filter at any time. (At conventional system, filter is followed the input signal.)

Fig.11-2 shows the block diagram. System is consists of the control block and filter block. Control block is consists of band-pass filter (BPF1), FM detector (DET1) and low-pass filter (LPF).

The band-pass filter (BPF1) has the same characteristic as conventional tuner's narrow filter, and this filter has selective characteristic sufficiently.

When FM signal is inputed, FM signal is detected by FM detector (DET1) after pass through the band-pass filter (BPF1). And then, output signal of FM detector (DET1) is cut the useless high-frequency elements by low-pass filter (LPF).

Filter block is consists of two mixer (MIX1 and 2), band-pass filter (BPF2) and VCO.

Mixer 1 (MIX1) perform frequency change so that multiply input FM signal by VCO output.

F-91 introduce the secondary IF frequency as 13.45 MHz.

Band-pass filter (BPF2) has the same narrow bandwidth characteristic as the band-pass filter (BPF1).

This filter (BPF2) cut the obstruction wave including input signal.

Input signal of passed through the band-pass filter (BPF2) is multiplied by VCO output at mixer (MIX2) again, then change to the original frequency.

Original signal is detected by FM detector (DET2), then audio output is obtained.

In this way, in spite of use the filter of fixed the center frequency, F-91 operate to the variable filter so that center frequency follow the input signal as equivalent.

If desired signal (S) and undesired signal (U) apply to input as shown in Fig.11-2, first, these signals are applied to control block, and cut the undesired signal (U) by BPF1. At this time, desired signal is distorted by BPF1.

This desired signal without undesired signal is detected by FM detector (DET1), then changed the FM waveform by VCO again.

Output signal of VCO is sum of the desired signal (S) and the distortion element (D).

This distortion element (D) not only include generated distortion at filter (BPF1) but also include generated distortion at detector and VCO.

On the other hand, desired signal (S) and undesired signal (U) apply to the filter block, then mix with the VCO output. Direction of desired signal's modulation is same way as input signal.

The differential element is took out from mixer 1 (MIX1)'s output by BPF2. At this time, desired signal (S) is vanished and undesired signal (U) is eliminated by BPF2.

Therefore, only distortion element (D) pass through the BPF2.

When distortion element (D) pass through the BPF2, element (D) hardly distort so that frequency deviation of the distortion element (D) is just a little.

And signal is mixed with VCO output by mixer 2 (MIX2) and pick up the differential element again. Then, desired signal (S) is obtained to not distortion. At this time, undesired signal (U) has eliminated.

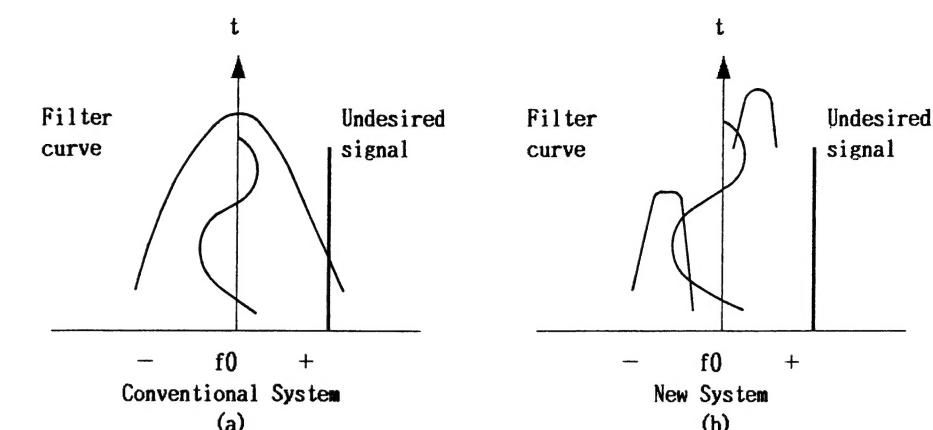


Fig.11-1 Signal tracing characteristics

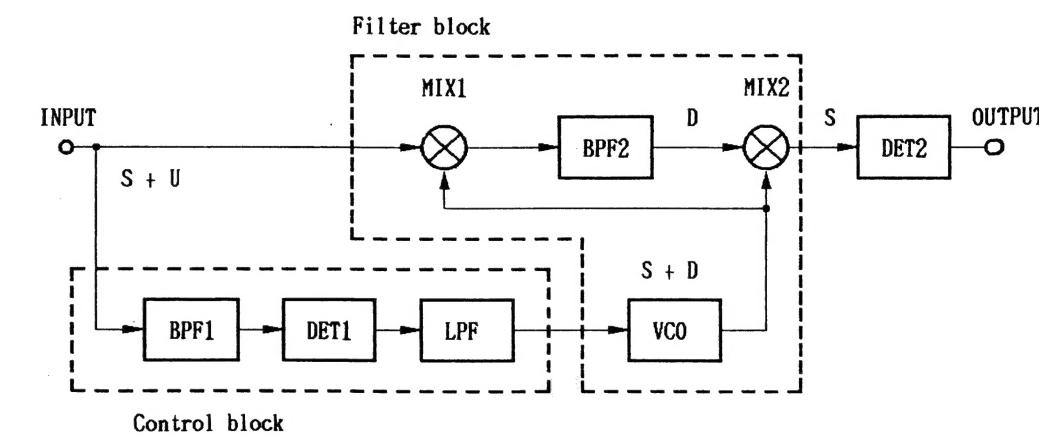


Fig.11-1 Blockdiagram of Active Real-time Tracing System

## 12. FOR HE, HB, HEZ AND SD/G TYPES

### NOTES:

- Parts without part number cannot be supplied.
- Parts marked by “●” are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The △ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.

★★ GENERALLY MOVES FASTER THAN ★  
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

### Contrast of Miscellaneous Parts.

The F-91/HE, HB, HEZ and SD/G types are the same as the F-91/KU/CA type with the exception of the following sections.

Mark	Symbol & Description	Part No.					Remarks
		F-91/KU/CA type	F-91/HE type	F-91/HB type	F-91/HEZ type	F-91/SD/G type	
△	TUNER assembly	AWZ1568	AWZ1567	AWZ1567	AWZ1566	AWZ1569	
	REMOCON assembly	Non supply	· · · ·	· · · ·	· · · ·	Non supply	
	Acrylic panel	AAK1298	AAK1303	AAK1303	AAK1303	AAK1298	
	FL filter	AAK1300	AAK1299	AAK1299	AAK1299	AAK1300	
	Connection cord with Mini plug	ADE-085	· · · ·	· · · ·	· · · ·	ADE-085	
	AC power cord	ADG-088	ADG1021	ADG-063	ADG1010	ADG-088	
	FM antenna	ADH-005	· · · ·	· · · ·	· · · ·	ADH-005	
	FM antenna assembly	· · · ·	ADH1002	ADH1002	ADH1002	· · · ·	
	Antenna adaptor	AKX-080	· · · ·	· · · ·	· · · ·	AKX-080	
	Side board L	AMS1015	AMS1019	AMS1015	AMS1019	AMS1015	
△ ★	Side board R	AMS1016	AMS1020	AMS1016	AMS1020	AMS1016	
	Operating instructions (English)	ARB1075	· · · ·	ARB1075	· · · ·	ARB1075	
	(English / German / French / Italian)	· · · ·	ARE1054	· · · ·	· · · ·	· · · ·	
	(German)	· · · ·	· · · ·	· · · ·	ARC1051	· · · ·	
	(Spanish)	· · · ·	· · · ·	· · · ·	· · · ·	ARC1068	
	Power transformer (T901) (AC120V)	ATT1043	· · · ·	· · · ·	· · · ·	· · · ·	
△ ★	(AC220/240V)	· · · ·	ATT1045	ATT1045	ATT1045	· · · ·	
	(AC110/120-127/220/240V)	· · · ·	· · · ·	· · · ·	· · · ·	ATT1044	
	Screw	· · · ·	· · · ·	· · · ·	ABA1035	· · · ·	
	Spacer	· · · ·	· · · ·	· · · ·	· · · ·	AHB1021	For packing
	Packing case	AHD1259	AHD1259	AHD1259	AHD1259	AHD1260	For packing

## TUNER Assembly

The TUNER assembly AWZ1567 (HE and HB types), AWZ1566 (HEZ type) and AWZ1569 (SD/G type) are the same as the AWZ1568 (KU/CA type) with the exception of the following sections.

Mark	Symbol & Description	Part No.				Remarks
		AWZ1568	AWZ1567	AWZ1566	AWZ1569	
	C215, C216	CQMXA242J100	CQMXA182J100	CQMXA182J100	CQMXA182J100	
	R178	RD1/8PM822J	RD1/8PM473J	RD1/8PM473J	RD1/8PM473J	
	R214, R215	RN1/4PQ3162F	RDR1/4PM303J	RDR1/4PM303J	RDR1/4PM303J	
	R408 (2.2MΩ, 1/2W)	ACN-209	.....	.....	.....	
	R420, R421	RS1LMF181J	.....	.....	.....	
	R422	RS2LMF181J	.....	.....	.....	
	R530	RD1/8PM102J	.....	.....	RD1/8PM102J	
	Pal socket	.....	AKX1013	AKX1013	.....	
	C3 (0.01/25V)	ACG-036	ACG-036	.....	ACG-036	
	C3, C42	.....	.....	CCDCH150J50	.....	
	C41	.....	.....	CCCSL101J50	.....	
	C43	.....	.....	CKDYX104M25	.....	
	C267, C268 (0.01/25V)	.....	.....	ACG-036	.....	
	C270, C271	.....	.....	CQSX1152J160	.....	
	L2 FM RF coil	ATC-205	ATC-205	.....	ATC-205	
	L206, L207	.....	.....	LAU2R2M	.....	
	L208, L209	.....	.....	LAU101K	.....	
	L401 Line filter	.....	.....	ATF-151	.....	
	R33	.....	.....	RD1/8PM472J	.....	
	T4 FM RF transformer	.....	.....	ATC-257	.....	
★★	Q210, Q211	.....	.....	.....	2SK161	
★★	R259, R260	.....	.....	.....	RD1/8PM105J	
★★	S501 Slide switch (CHANNEL STEP/FM DE-EMPHASIS)	.....	.....	.....	ASH1009	
△★★	S902 Voltage selector (AC110/120-127/220/240V)	.....	.....	.....	AKX-505	
	C265, C266	.....	.....	.....	CQMA821J50	
	R34	RD1/2PM103J	.....	.....	.....	